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Introduction

One of the primary interests of the Earth Observing System (EOS) program is to study the role of terrestrial vegetation in large-scale global processes with the goal of understanding how the Earth functions as a system. This requires an understanding of the global distribution of vegetation types as well as their biophysical and structural properties and spatial/temporal variations. Vegetation Indices (VI) are robust, empirical measures of vegetation activity at the land surface. They are designed to

enhance the vegetation reflected signal from measured spectral responses by combining two (or more) different wavebands, often in the red (0.6-0.7 um) and NIR wavelengths (0.7-1.1 um).

The MODIS vegetation index (VI) products provide consistent, spatial and temporal comparisons of global vegetation conditions which can be used to monitor the Earth's terrestrial photosynthetic vegetation activity in support of phenologic, change detection, and biophysical interpretations. Gridded vegetation index maps depicting spatial and temporal variations in vegetation activity are derived at 16-day and monthly intervals for precise seasonal and interannual monitoring of the Earth's terrestrial vegetation.

Two vegetation index (VI) products are made globally robust and are produced globally for land. One is the standard normalized difference vegetation index (NDVI), which is referred to as the "continuity index" to the existing NOAA-AVHRR derived NDVI. There is a 20-year NDVI global data set (1981 - 2000) from the NOAA- AVHRR series, which could be extended by MODIS data to provide a long term data record for use in operational monitoring studies. The second VI product is the "enhanced" vegetation index (EVI) with improved sensitivity over high biomass regions and improved vegetation monitoring capability through a de-coupling of the canopy background signal and a reduction in atmosphere influences. The two VIs complement each other in global vegetation studies and improve upon the extraction of canopy biophysical parameters. A new compositing scheme that reduces angular, sun-target-sensor variations, with an option to implement BRDF models, is also utilized. The gridded vegetation index maps use MODIS surface reflectances corrected for molecular scattering, ozone absorption, and aerosols, as input to the VI equations. The gridded vegetation indices include quality assurance (QA) flags with statistical data that indicate the quality of the VI product and input data. The MODIS VI products are generated at multiple spatial resolutions every sixteen days and each calendar month. Currently, the MODIS VIs are produced at 250m, 500m and 1km resolutions. A coarser, 0.25 degree, climate modeling grid (CMG) version is forthcoming. For production purposes MODIS VIs are produced in ***tile*** units that are approximately 1200km by 1200km in the integerized sinusoidal grid projection. Only tiles containing land features are considered to help reduce processing and disk space requirements. When mosaicked, all tiles cover the terrestrial Earth and the global MODIS-VI can thus be generated each 16 days and each calendar month.In this user guide we introduce the MODIS VI science algorithm, file formats and data structure. This document serves as a reference manual for end users when acquiring, accessing, or analyzing MODS VI products.

File Format of the MODIS VI Products

The MODIS production and science team chose the Hierarchical Data Format-Earth Observing System (HDF-EOS) format, which is the standard archive format for EOS Data Information System (EOSDIS) products. Each MODIS-VI file contains two separate structures:

1. Scientific data sets (SDS) which are the actual data stored in array format (2-D, 3-D and even 4-D),

2. Three sets of metadata:

- structural metadata that describes the actual content of the file,

- core metadata that describes the projection and grid name,

- archive metadata that describes various aspects of the file in terms of dates, times, statistics about quality, useful to archive and search the product.

All MODIS VI products are in a grid structure, which are defined as projected, fixed-area size files. This was done for geolocation purposes and to facilitate the correlation between the data and its actual location on Earth. Other formats used to store MODIS data are the point structure and the swath structure. The use of metadata is meant to enhance the self-describing characteristics of HDF files and is useful to the end user, facilitating the archiving and searching of files. Parameter Value Language (PVL) is used to write the various metadata to the product file as:

PARAMETER = VALUE

There are two types of metadata attributes: 1) global attributes which are general to all MODIS products and 2) product specific attributes (PSA). From a practical perspective, metadata will provide the user with general information about the file contents, its characteristics and quality (through the QA PSA), which is used to decide if the file is useful. The scientific data sets (SDS) could then be used for further analyses and use of the product.

MODIS VI Product Sequence

There are 5 products in the MODIS VI sequence (Fig. 1)

1. MOD13A1: 16-day 250m or 500m VI

2. MOD13A2 16-day 1km VI

3. MOD13A3 monthly 1km VI

4. MOD13C1 16-day 25km VI

5. MOD13C2 monthly 25km VI

All products rely on the upstream surface reflectance (MOD09 series) product, which is a daily level (L2) product. The VI algorithms ingest the level 2G surface reflectances and temporally composite these to generate the 16-day, 250/500m or 1km VI products. The 1 km VI product (MOD13A2), however, must first aggregate 250m and 500m MODIS pixel sizes to 1km by way of the MODAGG algorithm (Fig. 1). The CMG product, MOD13C1, is generated through spatial averaging of the 1km

version, MOD13A2. Both monthly products, MOD13A3 and MOD13C2, are temporal averages of their 16-day versions.

Figure 2 is an overview of the input and output data flow to the MODIS VI products. The associated "Science Data Sets" (SDS) are included for each product and vary from 6 for MOD13A1 to 17 for the MOD13C1 product.

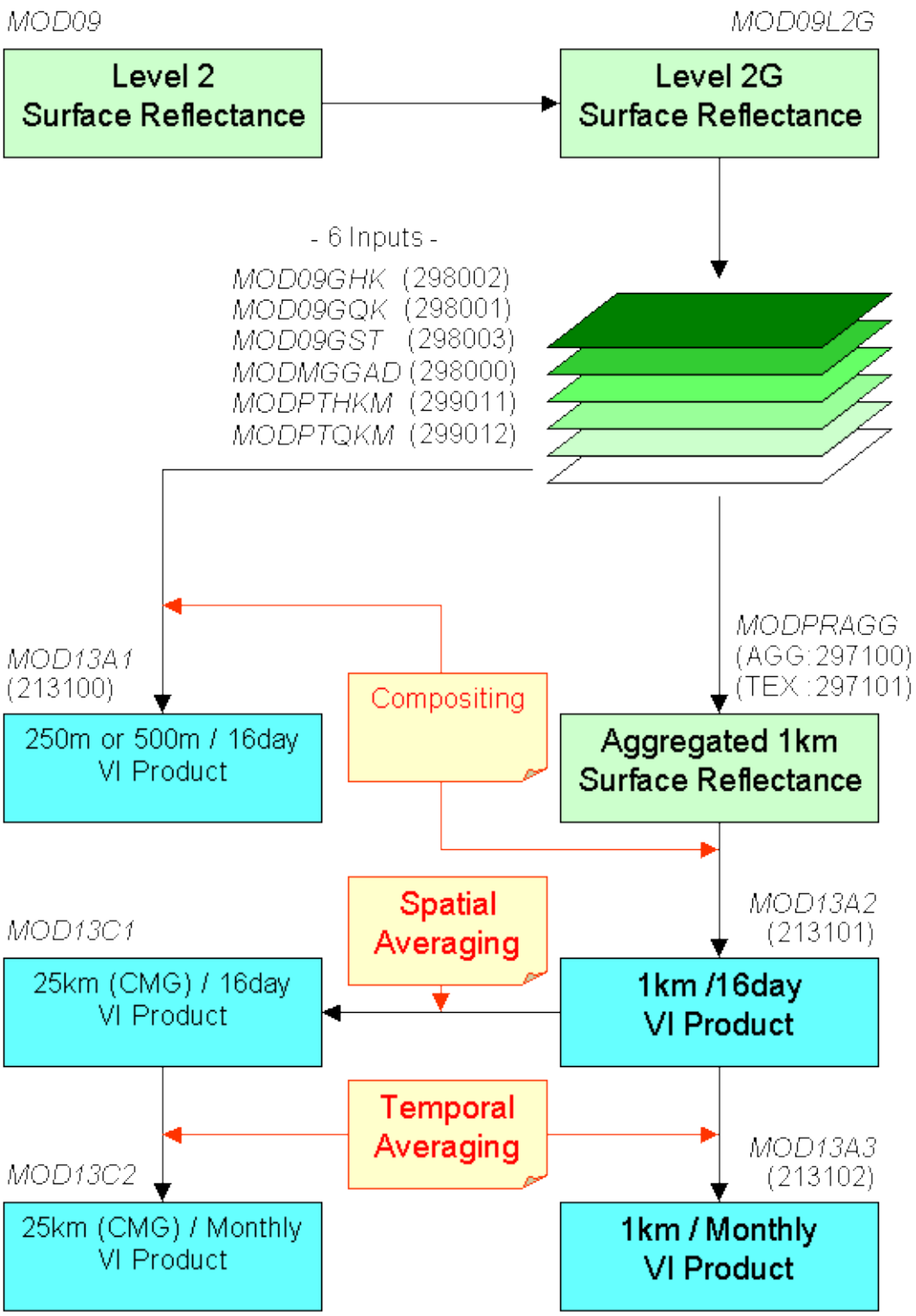


Figure 1: Overview of the MODIS-VI product and their required inputs.

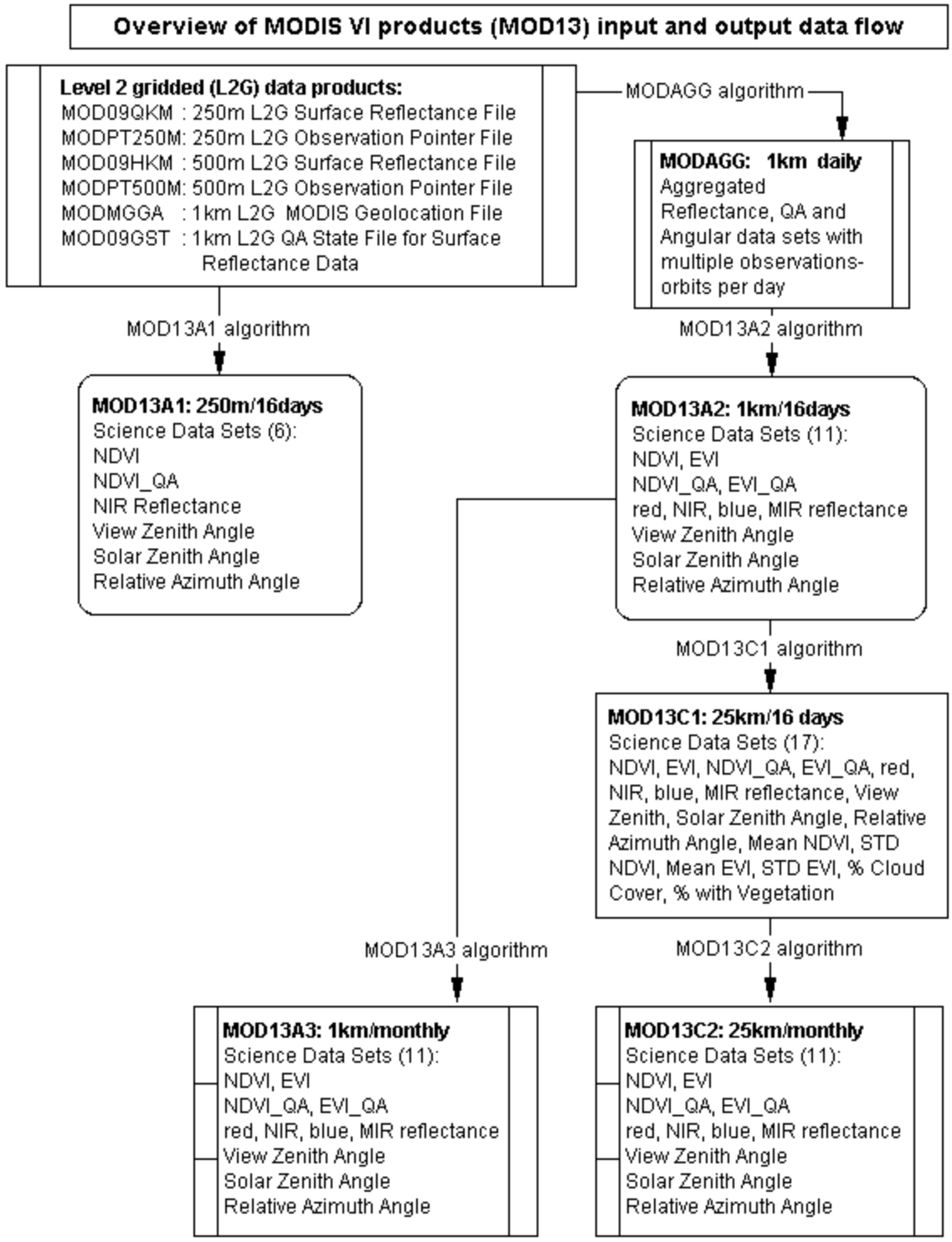

Overview of MODIS VI products (MOD13) input and output data flow
Level 2 gridded (L2G) data products:
MOD09QKM : 250m L2G Surface Reflectance File
MODPT250M: 250m L2G Observation Pointer File
MOD09HKM : 500m L2G Surface Reflectance File
MODPT500M: 500m L2G Observation Pointer File
MODMGGA : 1km L2G MODIS Geolocation File
MOD09GST : 1km L2G QA State File for Surface Reflectance Data
MODAGG algorithm
MODAGG: 1km daily
Aggregated Reflectance, QA and Angular data sets with multiple observations-orbits per day
MOD13A1 algorithm
MOD13A2 algorithm
MOD13A1: 250m/16days
Science Data Sets (6):
NDVI
NDVI_QA
NIR Reflectance
View Zenith Angle
Solar Zenith Angle
Relative Azimuth Angle
MOD13A2: 1km/16days
Science Data Sets (11):
NDVI, EVI
NDVI_QA, EVI_QA
red, NIR, blue, MIR reflectance
View Zenith Angle
Solar Zenith Angle
Relative Azimuth Angle
MOD13C1 algorithm
MOD13C1: 25km/16 days
Science Data Sets (17):
NDVI, EVI, NDVI_QA, EVI_QA, red, NIR, blue, MIR reflectance, View Zenith, Solar Zenith Angle, Relative Azimuth Angle, Mean NDVI, STD NDVI, Mean EVI, STD EVI, % Cloud Cover, % with Vegetation
MOD13A3 algorithm
MOD13C2 algorithm
MOD13A3: 1km/monthly
Science Data Sets (11):
NDVI, EVI
NDVI_QA, EVI_QA
red, NIR, blue, MIR reflectance
View Zenith Angle
Solar Zenith Angle
Relative Azimuth Angle
MOD13C2: 25km/monthly
Science Data Sets (11):
NDVI, EVI
NDVI_QA, EVI_QA
red, NIR, blue, MIR reflectance
View Zenith Angle
Solar Zenith Angle
Relative Azimuth Angle

Figure 2: MODIS VI product series

MOD13A1 VI Product Description

This product is generated using the daily MODIS Level-2G (L2G) surface reflectance, the L2G "pointer file", the L2G "geo-angle file" and the L2G 1km "state file" (Fig. 3). The output file contains a variable number of SDS's depending on the input resolution. When both NDVI and EVI are produced at either 250m or 500m the SDS content is as follows:

- 250m 16-day NDVI
- 250m 16-day EVI
- 250m 16-day NDVI Quality
- 250m 16-day EVI Quality
- 250m 16-day red reflectance
- 250m 16-day NIR reflectance
- 250m 16-day blue reflectance
- 250m 16-day MIR reflectance
- 250m 16-day average view zenith angle
- 250m 16-day average sun zenith angle
- 250m 16-day average relative azimuth angle

Similarly, at 500m the SDS names would be labeled 500m. Examples of the 16-day 250m MODIS products for the Southwest U.S.A. are included in this document:

- 16-day 250m NDVI
- 16-day 250m EVI.

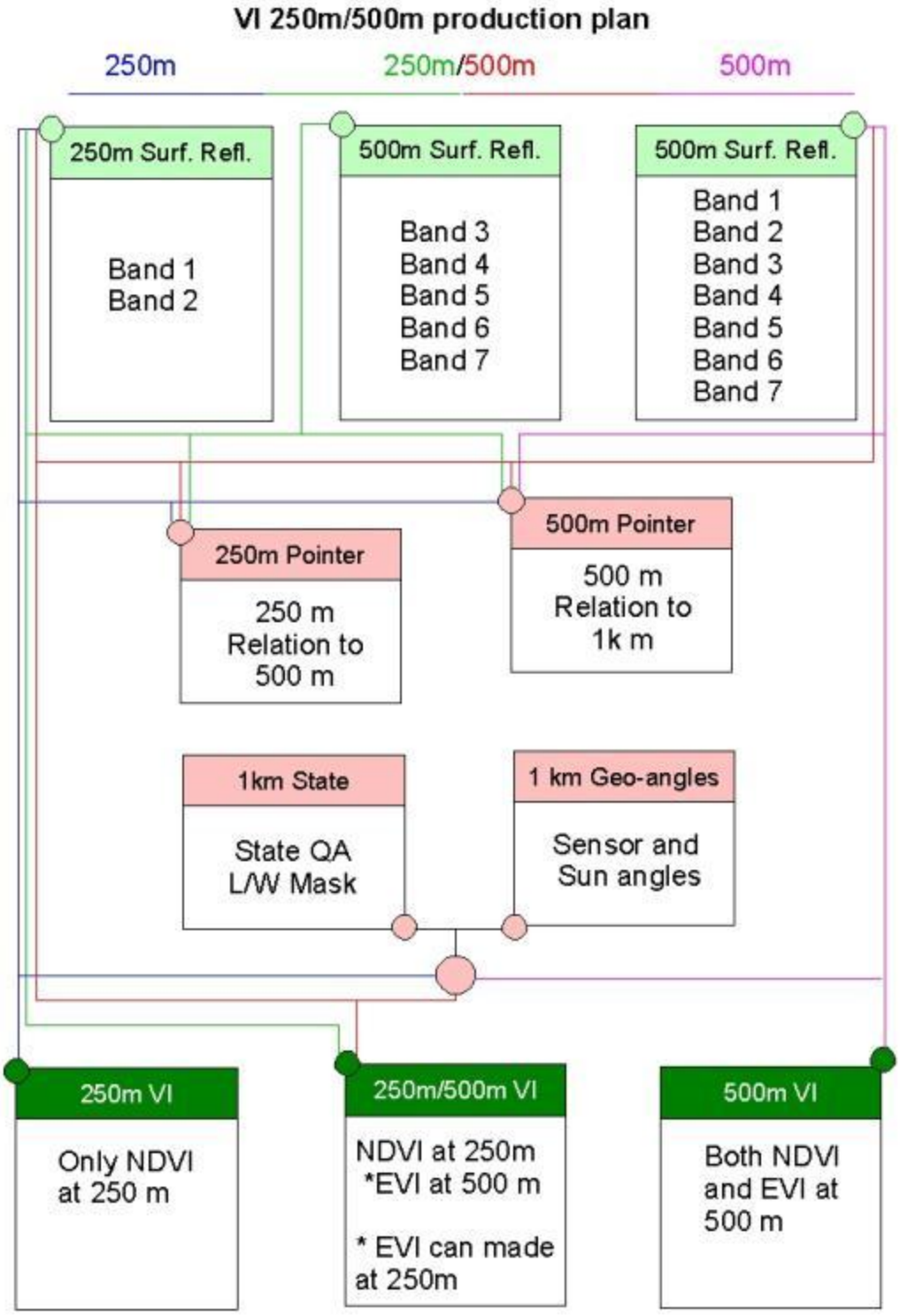


Figure 3: 250m/500m MODIS VI production flow diagram.

Algorithm Description

The VI algorithm operates on a per-pixel basis and requires multiple observations (days) to generate a composited VI. Due to sensor orbit overlap, multiple observations may exist for one day and a maximum of four observations may be collected. In theory, this can result in a maximum of 64 observations over a 16-day cycle, however, due to the presence of clouds and the actual sensor spatial coverage, this number will range between 64 and 0 with decreasing observations from higher to equatorial latitudes. The MOD13A1 algorithm separates all observations by their orbits providing a means to further filter the input data.

Once all 16 days are collected, the MODIS VI algorithm applies a filter to the data based on quality, cloud, and viewing geometry (Fig. 4). Cloud-contaminated pixels and extreme off-nadir sensor views are considered lower quality. A cloud-free, nadir view pixel with no residual atmospheric contamination represents the best quality pixel. Only the higher quality, cloud-free, filtered data are retained for compositing. Thus, the number of acceptable pixels over a 16-day compositing period is typically less than 10 and often varies between 1 and 5, especially when one considers a mean global cloud cover of 50 – 60%. The goal of the compositing methodology is to extract a single value per pixel from all the retained filtered data, which is representative of each pixel over the particular 16-day period. The VI compositing algorithm utilized here uses a methodology with three separate components (Fig. 5):

1. MVC: maximum value composite,

2. CV-MVC: constraint-view angle - maximum value composite,

3. BRDF-C: bidirectional reflectance distribution function composite.

The technique employed depends on the number and quality of observations. The maximum value composite (MVC) is similar to that used in the AVHRR-NDVI product, in which the pixel observation with the highest NDVI value is selected to represent the entire period (16 days). Furthermore, the MOD13A1 algorithm will choose the orbit observation with the highest NDVI if presented with multiple observations for the same day (multiple orbits).

The CV-MVC, is an enhanced MVC technique, in which the "***n***" number of observations (***n*** being set to 3 at the moment) with the highest NDVI are compared and the observation with the smallest view angle, i.e. closest to nadir view, is chosen to represent the 16-day composite cycle. The BRDF scheme is a more elaborate technique in which the algorithm utilizes all individual band observations, of acceptable quality, to interpolate to their nadir-equivalent reflectance value from which the VI is computed and produced. Currently the Walthal semi-empirical BRDF model is being utilized for the BRDF compositing scheme.

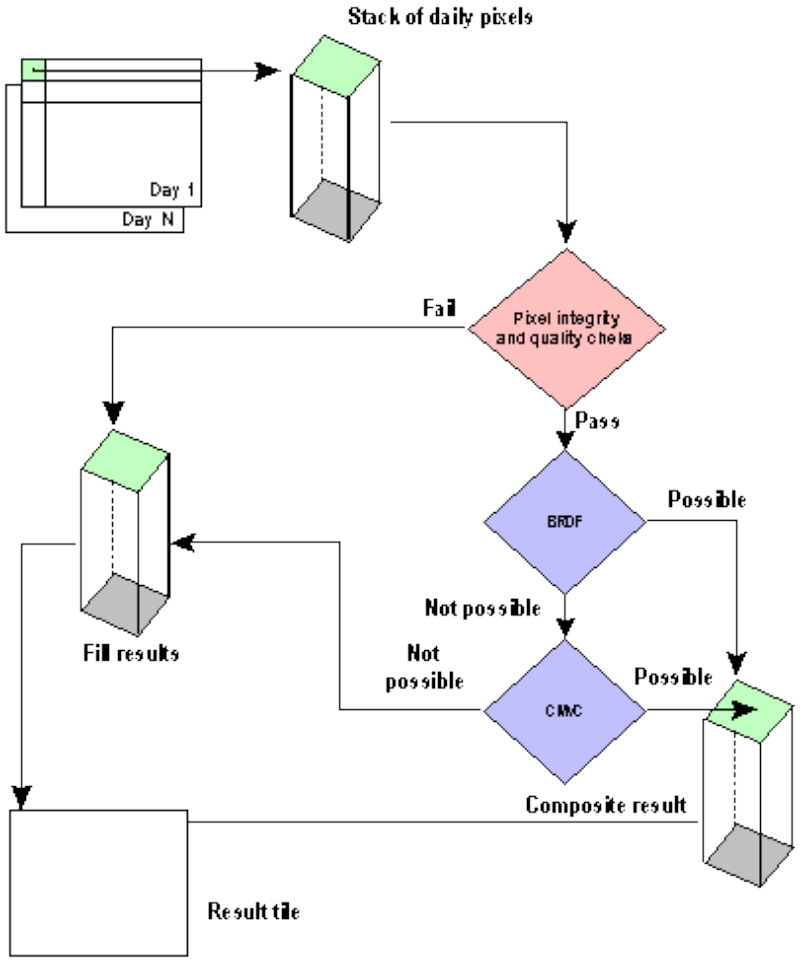


Figure 4: Compositing algorithm data flow

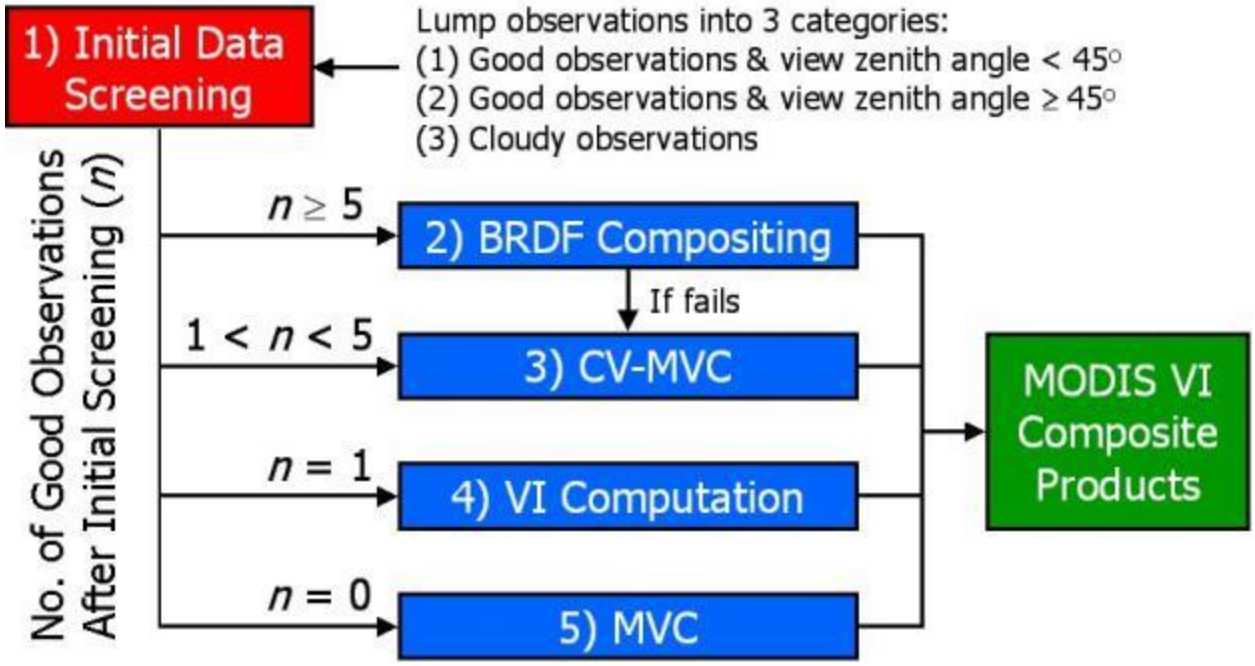

1) Initial Data Screening
Lump observations into 3 categories:
(1) Good observations & view zenith angle < 45°
(2) Good observations & view zenith angle ≥ 45°
(3) Cloudy observations
No. of Good Observations After Initial Screening (n)
n ≥ 5
2) BRDF Compositing
If fails
1 < n < 5
3) CV-MVC
n = 1
4) VI Computation
n = 0
5) MVC
MODIS VI Composite Products

Figure 5: MODIS-VI algorithm flow diagram

If five, good quality observations are available for a given pixel, then the BRDF module is employed to derive nadir interpolated reflectance values from which the VI's are computed (Fig. 5). If there are less than five acceptable values then the constrained view angle – maximum value composite (CV-MVC) module is employed. Finally, the MVC technique serves as the backup, such that the pixel with the highest VI value is assumed to be most representative over the 16-day period marked by less than optimal data quality (Fig. 5). All compositing methodolgies result in spatial discontinuities, which are inevitable and result from the fact that disparate days can always be chosen for adjacent pixels over the 16-day period. Thus, adjacent "selected" pixels may originate from different days, with different sun-pixel-sensor viewing geometries and different atmospheric and residual cloud/smoke contamination. The BRDF method has the potential to achieve spatial consistency through a standard nadir-view interpolation, however, at the moment the BRDF scheme can only be employed with a minimum of five good quality observations. Unfortunately, vegetation is most active during the rainy (and cloudy) season, even in the deserts, and this greatly impedes the optimal selection of pixels in any compositing methodoloy.

Scientific Data Sets

The 250m/500m VI product has the following characteristics (Table 1):

Table 1. Product MOD13A1: 16-day 250m/500m VI

Data field	*Name*	*Data type*
DataField_1	250m 16-day NDVI	INT16

DataField_2	250m 16-day EVI	INT16
DataField_3	250m 16-day NDVI Quality	UINT16
DataField_4	250m 16-day EVI Quality	UINT16
DataField_5	250m 16-day Red reflectance	INT16
DataField_6	250m 16-day NIR reflectance	INT16
DataField_7	250m 16-day blue reflectance	INT16
DataField_8	250m 16-day MIR reflectance	INT16
DataField_9	250m 16-day average view zenith angle	INT16
DataField_10	250m 16-day average sun zenith angle	INT16
DataField_11	250m 16-day average relative azimuth angle	INT16

Product Specific Metadata

A listing of the metadata fields used for QA evaluations of the MOD13A1 VI product is included in Table 2.

Table 2. Metadata fields for QA evaluation of MOD13A1

I. Inventory Metadata fields for all VI products (searchable)
QAPERCENTINTERPOLATEDDATA
QAPERCENTMISSINGDATA
QAPERCENTOUTOFBOUNDSDATA
QAPERCENTCLOUDCOVER
QAPERCENTGOODQUALITY
QAPERCENTOTHERQUALITY
QAPERCENTNOTPRODUCEDCLOUD
QAPERCENTNOTPRODUCEDOTHER
II. Product specific metadata (searchable)

Product	***Specific Metadata variable name (Best Quality)***
MOD13A1	NDVI250M16DAYQCLASSPERCENTAGE

III. Archived Metadata (not searchable)

Product	***Metadata variable name (Array of QA usefulness histogram)***
MOD13A1	QAPERCENTPOORQ250M16DAYNDVI

Global and local Metadata Attributes

As in all MODIS products, the global metadata is written to the ouput file during the generation process and could be used for searching the archive about the product. A listing of all metadata found in the MODIS 13A1, VI product file is included in Appendix 1.

Quality Assurance

The quality of the MOD13A1 product is indicated and assessed through the quality assessment (QA) metadata objects and QA science data sets (SDS's). The QA metadata objects summarize tile-level (granule) quality with several single words and numeric numbers, and thus are useful for data ordering and screening processes. The QA SDS's, on the other hand, document product quality on a pixel-by-pixel basis and thus are useful for data analyses and application uses of the data.

QA Metadata

There are 18 QA metadata objects in the MOD13A1 product. These objects are listed in Table 3 where they are characterized by the following five attributes:

1. Object name - Uniquely identifies and describes the content of each object.

2. Object type - Describes the object as either an ECS mandatory, MODLAND mandatory, or VI product specific metadata object, and also as either text or numeric.

3. Group name - Identifies a metadata group to which the object belongs. All of the QA metadata objects belong to either the InventoryMetadata or ArchiveMetadata groups.

4. Description - Briefly describes the object, its valid value or format, and its sample value(s).

5. Level - Describes whether the object value is given for each SDS or not.

The ECS QA metadata are mandatory to all of the EOS products (the first 10 objects in Table 3), all of which are given for each SDS of the MOD13A1 product. The first 6 objects are called "QAFlags", including AutomaticQualityFlag, OperationalQualityFlag, ScienceQualityFlag, and their explanations. The AutomaticQualityFlag object indicates a result of an automatic QA performed during product generation and the following criteria are used to set its value:

1) Set to "Passed" if QAPercentMissingData ≤ 5%,

2) Set to "Suspect" if QAPercentMissingData > 5% or < 50%,

3) Set to "Failed" if QAPercentMissingData ≥ 50%,

where the "QAPercentMissingData" is also an ECS QA metadata object and is described below. Explanation of the result of the AutomaticQualityFlag is given in the AutomaticQualityFlagExplanation metadata object.

The OperationalQualityFlag indicates the results of manual, non-science QA performed by processing facility personnel (DAAC or PI), i.e., if data are not corrupted in the transfer, archival, and retrieval processes. The flag has the value of "Not Being Investigated" if no non-science QA is performed. If the flag has the value other than "Passed" or "Not Being Investigated", explanation is given in the OperationalQualityFlagExplanation object.

The ScienceQualityFlag indicates the results of manual, science-QA performed by personnel at the VI Science Computing Facility (SCF). As for the OperationalQualityFlag, the flag has the value of "Not Being Investigated" if science QA is not performed. Explanation is given in the ScienceQualityFlagExplanation object if the flag has the value other than "Passed" or "Not Being Investigated".

The last 4 ECS QA metadata objects are called "QAStats". The QAStats indicate the percentages of pixels in the tile of which values are either interpolated (QAPercentInterpolatedData), missing (QAPercentMissingData), out of a valid range (QAPercentOutOfBoundData), or contaminated by cloud cover (QAPercentCloudCover).

There are 4 MODLAND mandatory QA metadata objects, all of which are designed to complement the ECS QA metadata objects. These indicate the percentages of pixels in the tile that are either good quality (QAPercentGoodQuality), unreliable quality (QAPercentOtherQuality), covered by cloud (QAPercentNotProducedCloud), or not produced due to bad quality other than cloud cover (QAPercentNotProducedOther). Different from the ECS QA metadata, only one set of values are given per tile.

The last 4 QA metadata objects in Table 3 are designed specifically for the MODIS VI product(s) (Product Specific Attributes, PSAs). Both the NDVI500M16DAYQCLASSPERCENTAGE and EVI500M16DAYQCLASSPERCENTAGE objects indicate the percentages of pixels with good quality in the tile and, thus, should be equal to the QAPercentGoodQuality value unless there is a significant difference between the NDVI and EVI performance for the same tile.

The QAPERCENTPOORQ500M16DAYNDVI and QAPERCENTPOORQ500M16DAYNDVI indicate, respectively, the percent frequency distributions of the NDVI and EVI quality. Their values are computed as sums of the NDVI and EVI usefulness indices (described in the QA Science Data Set section) and, thus, include 16 integer numbers. The 16 numbers are ordered in the descending qualities from left to right and a sum of 16 numbers is always equal to 100. The first numbers in the QAPERCENTPOORQ500M16DAYNDVI and QAPERCENTPOORQ500M16DAYNDVI objects are equal to the values given in the NDVI500M16DAYQCLASSPERCENTAGE and EVI500M16DAYQCLASSPERCENTAGE objects, respectively.

Table 3. List of the QA Metadata Objects for the MOD13A1 Product

Object Name	Object Type	Group Name	Description	Level
AutomaticQuality Flag	ECS Mandatory QAFlags, Text	InventoryMetadata in *CoreMetadata.0*	Result of an automatic quality assessment performed during product generation Valid value: ﷺPassedﷺ, ﷺSuspectﷺ, or ﷺFailedﷺ	Per-SDS, Per-Tile
AutomaticQuality FlagExplanation	ECS Mandatory QAFlags, Text	InventoryMetadata in *CoreMetadata.0*	Explanation of the result of the automatic quality assessment Valid value: Up to 255 characters Sample value: ﷺRun was successful But no land data found/processedﷺ	Per-SDS, Per-Tile
OperationalQuality Flag	ECS Mandatory QAFlags, Text	InventoryMetadata in *CoreMetadata.0*	Result of an manual, non-science quality assessment performed by production facility personnel after production Valid value: ﷺPassedﷺ, ﷺSuspectﷺ, ﷺFailedﷺ, ﷺInferred Passedﷺ, ﷺInferred Failedﷺ, ﷺBeing Investigatedﷺ, or ﷺNot Being Investigatedﷺ	Per-SDS, Per-Tile
OperationalQuality FlagExplanation	ECS Mandatory QAFlags, Text	InventoryMetadata in *CoreMetadata.0*	Explanation of the result of the manual, non-science quality assessment Valid value: Up to 255 characters Sample value:	Per-SDS, Per-Tile
ScienceQuality Flag	ECS Mandatory QAFlags, Text	InventoryMetadata in *CoreMetadata.0*	Result of an manual, science quality assessment performed by science computing facility personnel after production Valid value: ﷺPassedﷺ, ﷺSuspectﷺ, ﷺFailedﷺ, ﷺInferred Passedﷺ, ﷺInferred Failedﷺ, ﷺBeing Investigatedﷺ, or ﷺNot Being Investigatedﷺ	Per-SDS, Per-Tile
ScienceQuality FlagExplanation	ECS Mandatory QAFlags, Text	InventoryMetadata in *CoreMetadata.0*	Explanation of the result of the manual, science quality assessment Valid value: Up to 255 characters Sample value:	Per-SDS, Per-Tile
QAPercent InterpolatedData	ECS Mandatory QAStats, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of interpolated data in the tile Valid value: 0~100 Sample value: 12	Per-SDS, Per-Tile

QAPercent MissingData	ECS Mandatory QAStats, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of missing data in the tile Valid value: 0~100 Sample value: 8	Per-SDS, Per-Tile
QAPercent OutOfBoundData	ECS Mandatory QAStats, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of data in the tile of which values are out of a valid range Valid value: 0~100 Sample value: 2	Per-SDS, Per-Tile
QAPercent CloudCover	ECS Mandatory QAStats, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of cloud covered data in the tile Valid value: 0~100 Sample value: 15	Per-SDS, Per-Tile
QAPercent GoodQuality	MODLAND Mandatory, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of data produced with good quality in the tile Valid value: 0~100 Sample value: ?4?	Per-Tile
QAPercent OtherQuality	MODLAND Mandatory, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of data produced with unreliable quality in the tile Valid value: 0~100 Sample value: ?56?	Per-Tile
QAPercent NotProducedCloud	MODLAND Mandatory, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of data produced but contaminated with clouds in the tile Valid value: 0~100 Sample value: ?32?	Per-Tile
QAPercent NotProducedOther	MODLAND Mandatory, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of data not produced due to bad quality in the tile Valid value: 0~100 Sample value: ?8?	Per-Tile
NDVI500M16DAY QCLASS PERCENTAGE	VI Product Specific, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of NDVI data produced with good quality in the tile Valid value: 0~100 Sample value: ?4?	Per-Tile
EVI500M16DAY QCLASS PERCENTAGE	VI Product Specific, Numeric	InventoryMetadata in *CoreMetadata.0*	Percentage of EVI data produced with good quality in the tile Valid value: 0~100	Per-Tile

			Sample value: ⍰4⍰	
QAPERCENT POORQ 500M16DAYNDVI	VI Product Specific, Numeric	Archived Metadata in *ArchiveMetadata.0*	Summary statistics (percent frequency distribution) of the NDVI usefulness index over the tile Valid format: (N, N, N, N, N, N, N, N, N, N, N, N, N, N, N, N), where N = 0~100 Sample value: (4,0,0,0,44,6,18,15,5,0,0,0,0,0,0,8)	Per-Tile
QAPERCENT POORQ 500M16DAYEVI	VI Product Specific, Numeric	Archived Metadata in *ArchiveMetadata.0*	Summary statistics (percent frequency distribution) of the NDVI usefulness index over the tile Valid format: (N, N, N, N, N, N, N, N, N, N, N, N, N, N, N, N), where N = 0~100 Sample value: (4,0,0,0,44,6,18,15,5,0,0,0,0,0,0,8)	Per-Tile

QA Science Data Sets

The MOD13A1 product include 2 QA science data sets (SDS⍰s) (the 250/500m 16 days NDVI Quality SDS for the NDVI and the 250/500m 16 days EVI Quality SDS for the EVI) which are also called the per-pixel QA. Their dimensions (the numbers of samples and lines) are the same as those of the VI SDS⍰s and each pixel consists of 10 bit-fields (a total of 16 bits). Their contents are explained in Fig. 6. Table 4 lists the names of the bit-fields (parameter names), the number of bits assigned for the bit-field, and the bit combinations and their corresponding descriptions. As seen in Table 4, the per-pixel QA bits are designed to document conditions under which each pixel was acquired and processed. The NDVI and EVI per-pixel QA bits have an identical format.

Table 4. Descriptions of the VI Quality Assessment Science Data Sets (QA SDS)

Bit No.	Parameter Name	Bit Comb.	Description
0-1	VI Quality (MODLAND Mandatory QA Bits)	00	VI produced with good quality
		01	VI produced but with unreliable quality and thus examination of other QA bits recommended
		10	VI produced but contaminated with clouds
		11	VI not produced due to bad quality
2-5	VI Usefulness Index	0000	Perfect quality (equal to VI quality = 00: VI produced with good quality)
		0001	High quality
		0010	Good quality
		0011	Acceptable quality
		0100	Fair quality
		0101	Intermediate quality
		0110	Below intermediate quality

		0111	Average quality
		1000	Below average quality
		1001	Questionable quality
		1010	Above marginal quality
		1011	Marginal quality
		1100	Low quality
		1101	No atmospheric correction performed
		1110	Quality too low to be useful
		1111	Not useful for other reasons (equal to VI quality = 11: VI not produced due to bad quality)
6-7	Aerosol Quantity	00	Climatology used for atmospheric correction
		01	Low
		10	Intermediate
		11	High
8	Atmosphere Adjacency Correction	0	(No) No adjacency correction performed
		1	(Yes) Adjacency correction performed
9	Atmosphere BRDF Correction	0	(No) No atmosphere-surface BRDF coupled correction performed
		1	(Yes) Atmosphere-surface BRDF coupled correction performed
10	Mixed Clouds	0	(No) No mixed clouds
		1	(Yes) Possible existence of mixed clouds
11-12	Land/Water Mask	00	Ocean/inland water - Shallow ocean - Moderate and continental ocean - Deep ocean - Deep inland water
		01	Coastal region - Ocean coastlines and lake shorelines - Shallow inland water
		10	Wetland - Ephemeral water
		11	Land
13	Snow/Ice	0	(No) No snow/ice
		1	(Yes) Possible existence of snow/ice
14	Shadow	0	(No) No shadow
		1	(Yes) Possible existence of shadow
15	Compositing Method	0	BRDF composite method used for compositing
		1	Constraint view angle MVC (CV-MVC) method used for compositing

The first two bits are used for the MODLAND mandatory per-pixel QA bits that summarize the VI quality of the corresponding pixel locations. Percentages of sums of its four possible values (bit combinations) over a tile will give the MODLAND mandatory QA metadata object values (Table 5).

Table 5. Relationship between the MODLAND Mandatory per-pixel QA Bits and QA Metadata Objects

VI Quality Bit Combination	Corresponding QA Metadata Object
00: VI produced, good quality	QAPercentGoodQuality
01: VI produced, unreliable quality	QAPercentOtherQuality
10: VI produced, contaminated with cloud	QAPercentNotProducedCloud
11: VI not produced due to bad quality other than cloud	QAPercentNotProducedOther

The 2nd QA bit-field is called the VI usefulness index. The usefulness index is a higher resolution quality indicator than the MODLAND mandatory QA bits (16 levels) and its value for a pixel is determined from several conditions, including 1) aerosol quantity, 2) atmospheric correction conditions, 3) cloud cover, 4) shadow, and 5) sun-target-viewing geometry (Table 6). As shown in Table 6, there is a specific score that is assigned to each condition and a sum of all the scores gives a usefulness index value for the pixel. An index value of 0000 is corresponding to the highest quality, while the lowest quality is equal to a value of 1100 (i.e., 13 levels). The three largest values are reserved for three specific conditions which are shown in Table 4. There are relationships between the VI usefulness index and the MODLAND mandatory QA bits. Pixels with the index value of 0000 and 1111 always have the MODLAND QA bit values of 00 and 11, respectively.

Table 6. VI Usefulness Index Scaling Method for the MOD13A1 Product

Parameter Name	Condition	Score
Aerosol Quantity	If aerosol climatology was used for atmospheric correction (00)	2
	If aerosol quantity was high (11)	3
Atmosphere Adjacency Correction	If no adjacency correction was performed (0)	1
Atmosphere BRDF Correction	If no atmosphere-surface BRDF coupled correction was performed (0)	2
Mixed Clouds	If there possibly existed mixed clouds (1)	3
Shadow	If there possibly existed shadow (1)	2
View zenith angle (q_v)	If $q_v > 40^o$	1
Sun zenith angle (q_s)	If $q_s > 60^o$	1

The next three QA bit-fields document atmospheric correction scenarios of each pixel. The bits 6-7 are used to indicate aerosol quantity, and the bits 8 and 9 indicate whether an adjacency correction and atmosphere-surface BRDF coupled correction, respectively, are applied or not.

The bit 10 indicates a possible existence of mixed clouds. As the original spatial resolutions of the red and NIR bands are 250 m, these two bands were spatially aggregated to a 500 m resolution before the computations of VIs. The mixed cloud QA bit is flagged if any of the 250 m resolution pixels that were used for the aggregations were contaminated with cloud.

The bits 10-11 are used for the land/water mask. The input land/water mask to the MOD13A1 VI product has 7 land/water classes. These 7 classes are lumped to 4

classes upon the generations of the VI products, including the ocean/inland water, coastal region, wetland, and land classes. The VIs are not computed for pixels only over the ocean/inland water class.

The bits 13 and 14 indicate possible existences of snow/ice and shadow, respectively.

The last QA bit field indicates a compositing method used for each pixel as the MODIS VI compositing algorithm utilizes two compositing methods (the BRDF compositing and CV-MVC methods) interchangeably from pixel to pixel. Currently, the BRDF compositing algorithm has been deactivated and, thus, this QA bit is always set to 1.

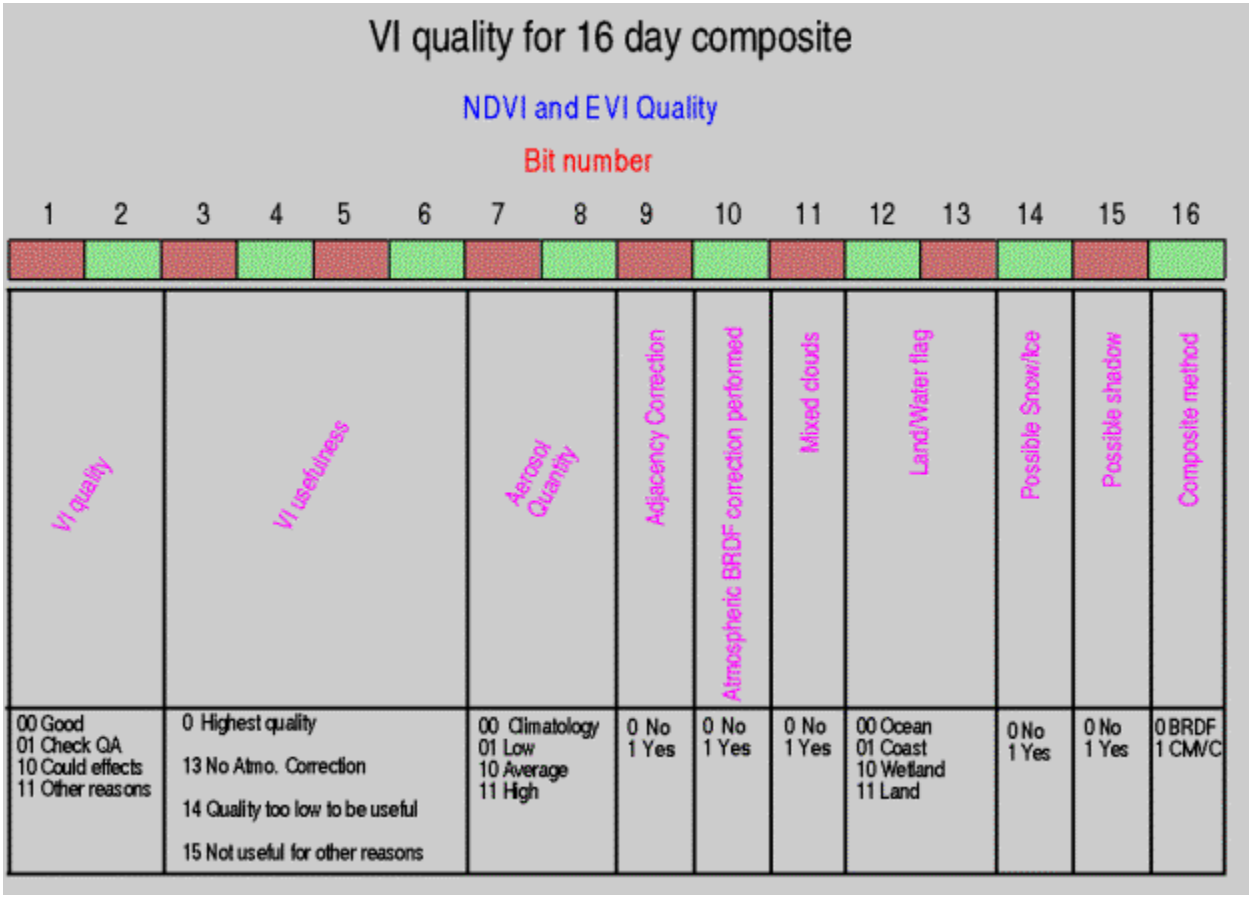


Figure 6: MODIS VI Quality Assurance SDS bit map.

MOD13A2 V6 Product Description

This product is generated using the output of the daily, MODIS surface reflectance aggregation algorithm (MODAGG). The output file contains 11 scientific data sets (SDS's):

- 1 km 16-day NDVI
- 1 km 16-day EVI
- 1 km 16-day NDVI Quality
- 1 km 16-day EVI Quality
- 1 km 16-day red reflectance
- 1 km 16-day NIR reflectance
- 1 km 16-day blue reflectance
- 1 km 16-day MIR reflectance
- 1 km 16-day average view zenith angle
- 1 km 16-day average sun zenith angle
- 1 km 16-day average relative azimuth angle

Examples of the 16-day 1 km MODIS products on a global scale are included in this document:

- 16-day_1km_NDVI
- 16-day_1km_EVI
- 16-day_1km QA

Algorithm Description

The VI algorithm, as in MOD13A1, operates on a per-pixel basis and requires multiple observations (days) to generate a composited VI. Due to sensor orbit overlap, multiple observations may exist for one day, hence the aggregation algorithm (MODAGG) precedes the VI algorithm. MODAGG will ingest all the daily projected (tile) surface reflectance data and generate a maximum of four observations based on quality, cloud cover, and viewing geometry. In theory, this can result in a maximum of 64 observations over a 16-day cycle, however, due to the presence of clouds and the actual sensor spatial coverage, this number will range between 64 and 0 with decreasing observations from higher to equatorial latitudes.

Once all 16 days are collected, the MODIS VI algorithm applies a filter to the data based on quality, cloud, and viewing geometry (Fig. 4). Cloud-contaminated pixels and extreme off-nadir sensor views are considered lower quality. A cloud-free, nadir view pixel with no residual atmospheric contamination represents the best quality pixel. Only the higher quality, cloud-free, filtered data are retained for compositing. Thus, the number of acceptable pixels over a 16-day compositing period is typically less than 10 and often varies between 1 and 5, especially when one considers a mean global cloud cover of 50 – 60%. The goal of the compositing methodology is to extract a single value per pixel from all the retained filtered data, which is representative of each pixel over the particular 16-day period. The VI compositing algorithm utilized here uses a methodology with three separate components (Fig. 5):

1. MVC: maximum value composite,

2. CV-MVC: constraint-view angle - maximum value composite,

3. BRDF-C: bidirectional reflectance distribution function composite.

The technique employed depends on the number and quality of observations. The maximum value composite (MVC) is similar to that used in the AVHRR-NDVI product, in which the pixel observation with the highest NDVI value is selected to represent the entire period (16 days). Furthermore, the MOD13A1 algorithm will choose the orbit observation with the highest NDVI if presented with multiple observations for the same day (multiple orbits).

The CV-MVC, is an enhanced MVC technique, in which the "***n***" number of observations (***n*** being set to 3 at the moment) with the highest NDVI are compared and the observation with the smallest view angle, i.e. closest to nadir view, is chosen to represent the 16-day composite cycle. The BRDF scheme is a more elaborate technique in which the algorithm utilizes all individual band observations, of acceptable quality, to interpolate to their nadir-equivalent reflectance value from which the VI is computed and produced. Currently the Walthal semi-empirical BRDF model is being utilized for the BRDF compositing scheme.

If five, good quality observations are available for a given pixel, then the BRDF module is employed to derive nadir interpolated reflectance values from which the VI's are computed (Fig. 5). If there are less than five acceptable values then the

constrained view angle • maximum value composite (CV-MVC) module is employed. Finally, the MVC technique serves as the backup, such that the pixel with the highest VI value is assumed to be most representative over the 16-day period marked by less than optimal data quality (Fig. 5) All compositing methodolgies result in spatial discontinuities, which are inevitable and result from the fact that disparate days can always be chosen for adjacent pixels over the 16-day period. Thus, adjacent •selected• pixels may originate from different days, with different sun-pixel-sensor viewing geometries and different atmospheric and residual cloud/smoke contamination. The BRDF method has the potential to achieve spatial consistency through a standard nadir-view interpolation, however, at the moment the BRDF scheme can only be employed with a minimum of five good quality observations. Unfortunately, vegetation is most active during the rainy (and cloudy) season, even in the deserts, and this greatly impedes the optimal selection of pixels in any compositing methodoloy.

Scientific Data Sets

The 1km VI product has the following Science Data Sets (Table 7):

Table 7. Product MOD13A2: 16-day 1 km VI

Data field	*Name*	*Data type*
DataField_1	1 km 16-day NDVI	INT16
DataField_2	1 km 16-day EVI	INT16
DataField_3	1 km 16-day NDVI Quality	UINT16
DataField_4	1 km 16-day EVI Quality	UINT16
DataField_5	1 km 16-day red reflectance	INT16
DataField_6	1 km 16-day NIR reflectance	INT16
DataField_7	1 km 16-day blue reflectance	INT16
DataField_8	1 km 16-day MIR reflectance	INT16
DataField_9	1 km 16-day average view zenith angle	INT16
DataField_10	1 km 16-day average sun zenith angle	INT16
DataField_11	1 km 16-day average relative azimuth angle	INT16

Product Specific Metadata

A listing of the metadata fields used for QA evaluations of the MOD13A2 VI product is included in Table 8.

Table 8. Metadata fields for QA evaluation of MOD13A2

I. Inventory Metadata fields for all VI products (searchable)
QAPERCENTINTERPOLATEDDATA
QAPERCENTMISSINGDATA

QAPERCENTOUTOFBOUNDSDATA
QAPERCENTCLOUDCOVER
QAPERCENTGOODQUALITY
QAPERCENTOTHERQUALITY
QAPERCENTNOTPRODUCEDCLOUD
QAPERCENTNOTPRODUCEDOTHER

II. Product specific metadata (searchable)

Product	***Specific Metadata variable name (Best Quality)***
MOD13A2	NDVI1KM16DAYQCLASSPERCENTAGE
MOD13A2	EVI1KM16DAYQCLASSPERCENTAGE

III. Archived Metadata (not searchable)

Product	***Metadata variable name (Array of QA usefulness histogram)***
MOD13A2	QAPERCENTPOORQ1KM16DAYNDVI
MOD13A2	QAPERCENTPOORQ1KM16DAYEVI

Global and local Metadata Attributes

As in all MODIS products, the global metadata is written to the ouput file during the generation process and could be used for searching the archive about the product. A listing of all metadata found in the MODIS 13A2, VI product file is included in Appendix 2.

Quality Assurance

In principal, the QA metadata objects and QA SDS's of the MOD13A2 product are the same as those of the MOD13A1 product. In this section, we only describe the differences of the MOD13A2 product QA from the MOD13A1 product QA.

QA Metadata

As the spatial resolution of the MOD13A2 product differs from that of the MOD13A1 product, the 4 VI PSA object names differ correspondingly. Table 9 lists the correspondences between these object names.

Table 9. Correspondence of the VI PSA QA Metadata Object Names between the MOD13A2 and MOD13A1 Products

Object Name in the MOD13A2	Object Name in the MOD13A1
NDVI1KM16DAYQCLASSPERCENTAGE	NDVI500M16DAYQCLASSPERCENTAGE
EVI1KM16DAYQCLASSPERCENTAGE	EVI500M16DAYQCLASSPERCENTAGE
QAPERCENTPOORQ1KM16DAYNDVI	QAPERCENTPOORQ500M16DAYNDVI
QAPERCENTPOORQ1KM16DAYEVI	QAPERCENTPOORQ500M16DAYEVI

QA Science Data Sets

As the atmospheric adjacency effects are no longer of importance for a 1 km distance, the QA bit field for the adjacency atmospheric correction (the bit 8) is used instead to indicate a possible existence of adjacency cloud in the MOD13A2 QA SDS's (Table 10). Accordingly, the condition of the atmospheric adjacency correction is not considered in the VI usefulness index computation (Table 11).

Table 10. Description of the 8th QA Bit for the MOD13A2 Product

Bit No.	Parameter Name	Bit Comb.	Description
8	Adjacency Cloud	0	(No) No adjacency cloud detected
		1	(Yes) Possible existence of adjacency cloud

Table 11. VI Usefulness Index Scaling Method for the MOD13A2 Product

Parameter Name	Condition	Score
Aerosol Quantity	If aerosol climatology was used for atmospheric correction (00)	2
	If aerosol quantity was high (11)	3
Atmosphere BRDF Correction	If no atmosphere-surface BRDF coupled correction was performed (0)	2
Mixed Clouds	If there possibly existed mixed clouds (1)	3
Shadow	If there possibly existed shadow (1)	2
View zenith angle (q_v)	If $q_v > 40^o$	1
Sun zenith angle (q_s)	If $q_s > 60^o$	1

MOD13A3 Product Description

This product is generated using the 1km 16 day MODIS VI output. The output file contains 11 SDS's:

- 1 km monthly NDVI
- 1 km monthly EVI
- 1 km monthly NDVI Quality
- 1 km monthly EVI Quality
- 1 km monthly red reflectance
- 1 km monthly NIR reflectance
- 1 km monthly blue reflectance
- 1 km monthly MIR reflectance
- 1 km monthly average view zenith angle
- 1 km monthly average sun zenith angle
- 1 km monthly average relative azimuth angle

Algorithm Description

This algorithm operates (Fig. 7) on a per-pixel basis and requires all 16-day VI products which overlap within a calendar month. Once all 16-day composites are collected, a weighing factor based on the degree of temporal overlap is applied to each input. In assigning the pixel QA, a worst case scenario is used, whereby the pixel with the lowest quality determines the final pixel QA.

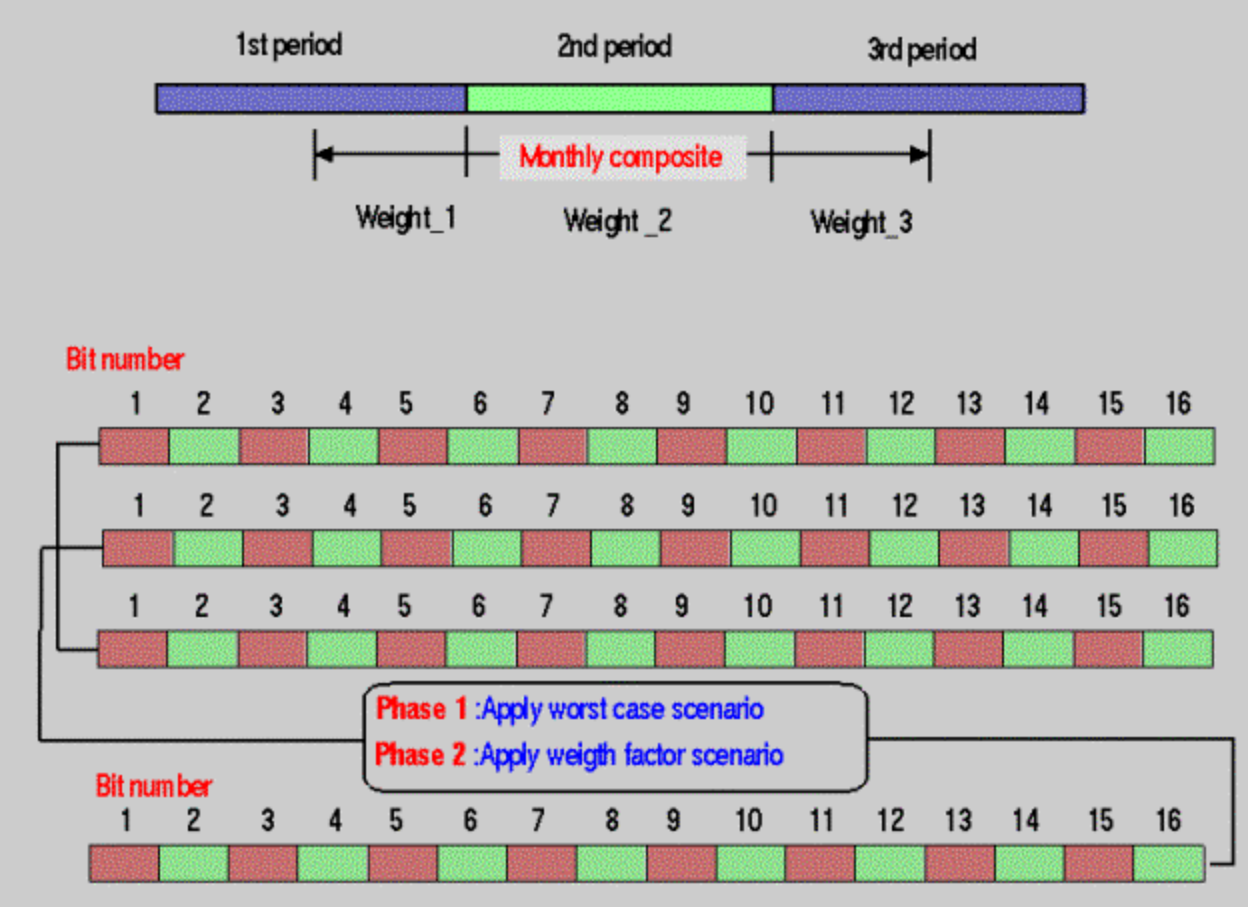

1st period
2nd period
3rd period
Monthly composite
Weight_1
Weight _2
Weight_3
Bit number
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Phase 1 :Apply worst case scenario
Phase 2 :Apply weigth factor scenario
Bit number
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Figure 7: Monthly MODIS VI flow diagram

Scientific Data Sets

The 1km monthly VI product has the following SDS's (Table 12):

Table 12. Product MOD13A3: month1y 1km VI

Data field	*Name*	*Data type*
DataField_1	1 km monthly NDVI	INT16
DataField_2	1 km monthly EVI	INT16
DataField_3	1 km monthly NDVI Quality	UINT16
DataField_4	1 km monthly EVI Quality	UINT16
DataField_5	1 km monthly red reflectance	INT16
DataField_6	1 km monthly NIR reflectance	INT16
DataField_7	1 km monthly blue reflectance	INT16
DataField_8	1 km monthly MIR reflectance	INT16
DataField_9	1 km monthly average view zenith angle	INT16
DataField_10	1 km monthly average sun zenith angle	INT16

DataField_11	1 km monthly average relative azimuth angle	INT16

Product Specific Metadata

A listing of the metadata fields used for QA evaluations of the MOD13A3 VI product is included in Table 13.

Table 13. Metadata fields for QA evaluation of MOD13A3

I. Inventory Metadata fields for all VI products (searchable)
QAPERCENTINTERPOLATEDDATA
QAPERCENTMISSINGDATA
QAPERCENTOUTOFBOUNDSDATA
QAPERCENTCLOUDCOVER
QAPERCENTGOODQUALITY
QAPERCENTOTHERQUALITY
QAPERCENTNOTPRODUCEDCLOUD
QAPERCENTNOTPRODUCEDOTHER

II. Product specific metadata (searchable)

Product	***Specific Metadata variable name (Best Quality)***
MOD13A3	NDVI1KMMONTHQCLASSPERCENTAGE
MOD13A3	EVI1KMMONTHQCLASSPERCENTAGE

III. Archived Metadata (not searchable)

Product	***Metadata variable name (Array of QA usefulness histogram)***
MOD13A3	QAPERCENTPOORQ1KMMONTHNDVI
MOD13A3	QAPERCENTPOORQ1KMMONTHEVI

Global and local Metadata Attributes

Almost the same as in MOD13A2 (1km 16-day VI), please refer to the MOD13A2 description.

Quality Assurance

As in the MOD13A1 and MOD13A2 products, each output pixel has two QA SDS's (NDVI and EVI quality). Their bit description is described in Fig. 6. As was done for the MOD13A2 product, we only describe the differences of the MOD13A3 product QA from the MOD13A1 product QA.

QA Metadata

As both the spatial and temporal resolutions of the MOD13A3 product differ from those of the MOD13A1 product, the 4 VI PSA object names differ correspondingly. Table 14 lists the correspondences between these object names.

Table 14. Correspondence of the VI PSA QA Metadata Object Names between the MOD13A3 and MOD13A1 Products

Object Name in the MOD13A2	Object Name in the MOD13A1
NDVI1KMMONTHQCLASSPERCENTAGE	NDVI500M16DAYQCLASSPERCENTAGE
EVI1KMMONTHQCLASSPERCENTAGE	EVI500M16DAYQCLASSPERCENTAGE
QAPERCENTPOORQ1KMMONTHNDVI	QAPERCENTPOORQ500M16DAYNDVI
QAPERCENTPOORQ1KMMONTHEVI	QAPERCENTPOORQ500M16DAYEVI

QA Science Data Set

As for the MOD13A2 product, the QA bit field for the adjacency atmospheric correction (the 8th bit) is used to indicate a possible existence of adjacency cloud in the MOD13A3 QA SDSs (Table 15).

The other difference is that the 14th bit is used to indicate whether mixed compositing methods were used, as the MOD13A3 product is derived as a weighting average of 2 – 3 MOD13A2 products of which 16 days periods overlap with a month (Table 15). Currently, the BRDF compositing algorithm has been deactivated and, thus, the 14th and 15th QA bit are always set to 0 and 1, respectively.

Table 15. Description of Two QA Bit-fields for the MOD13A3 VI Product

Bit No.	Parameter Name	Bit Comb.	Description
8	Adjacency Cloud	0	(No) No adjacency cloud detected
		1	(Yes) Possible existence of adjacency cloud
14	Mixed Compositing Methods	0	(No) Mixed compositing method not used
		1	(Yes) Mixed compositing method used

Related Web Sites

MODIS VI Web site: http://gaea.fcr.arizona.edu

Terra Website: http://terra.nasa.gov

MODIS Project: http://modarch.gsfc.nasa.gov/MODIS/MODIS.html

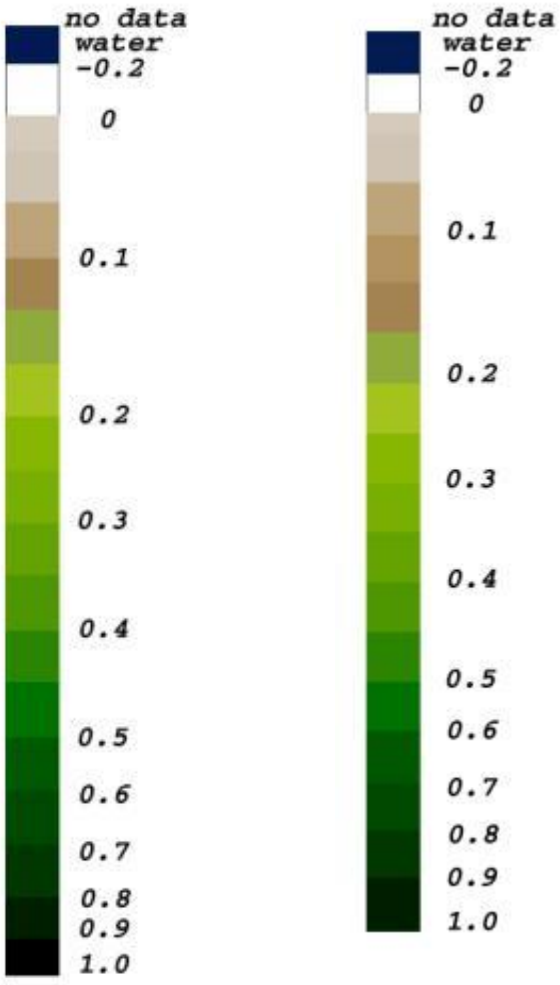
MODIS Land Discipline: http://modis-land.gsfc.nasa.gov/

EOSDIS: http://spsosun.gsfc.nasa.gov/ESDIShome.html

HDF: http://hdf.ncsa.uiuc.edu

HDF-EOS:http://hdfeos.gsfc.nasa.gov/hdfeos/workshop.html

ECS: http://observer.gsfc.nasa.gov/



EVI (left) and NDVI (right) Color Scale Legend

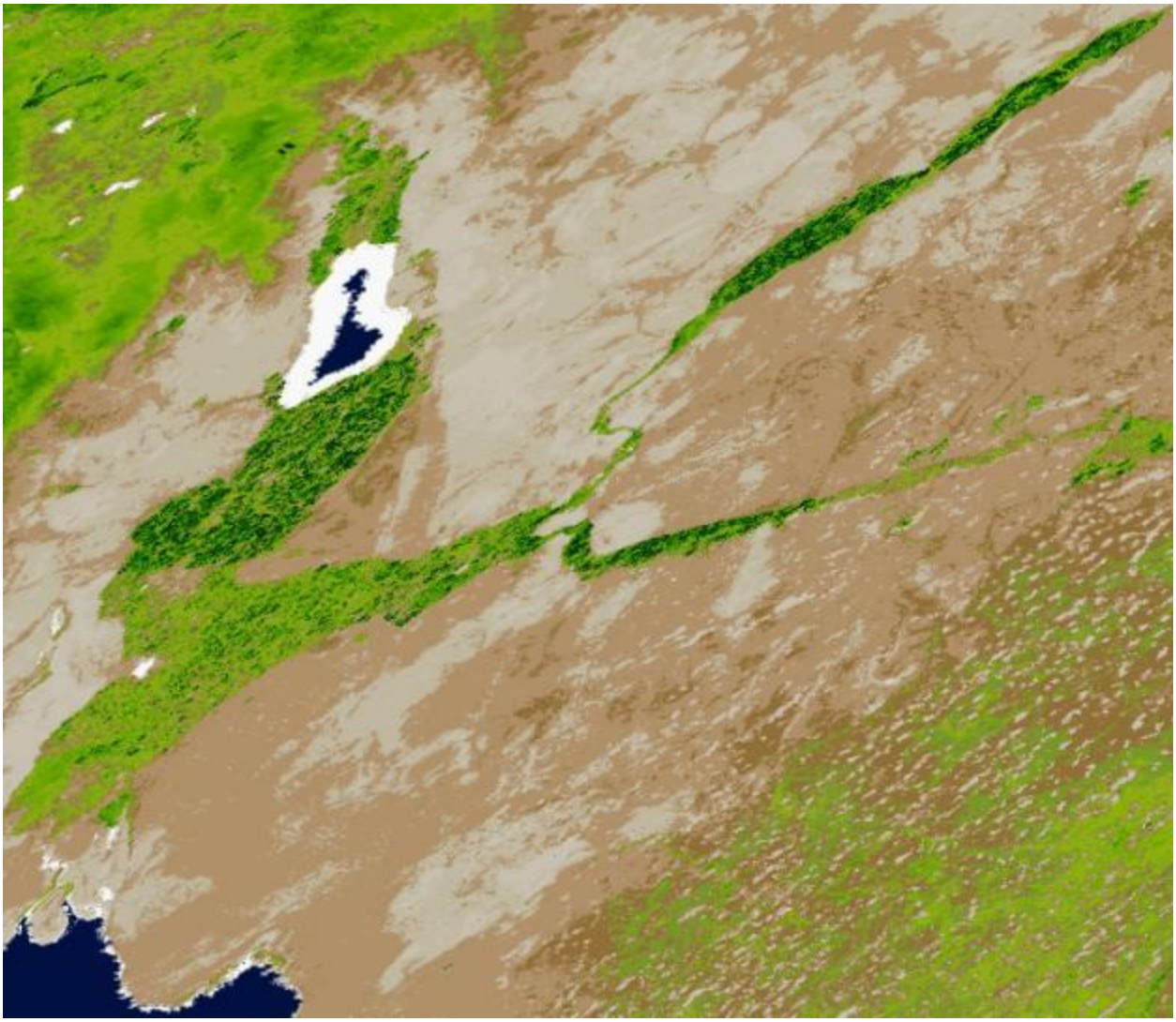


Figure 8*. Example of a 16-day MODIS 250m EVI, ISIN Grid. This Southwest U.S.A. image shows the Imperial Valley agriculture region, the U.S. – Mexico International border, the Salton Sea, Colorado River and Gila River.* `Color scale legend.`

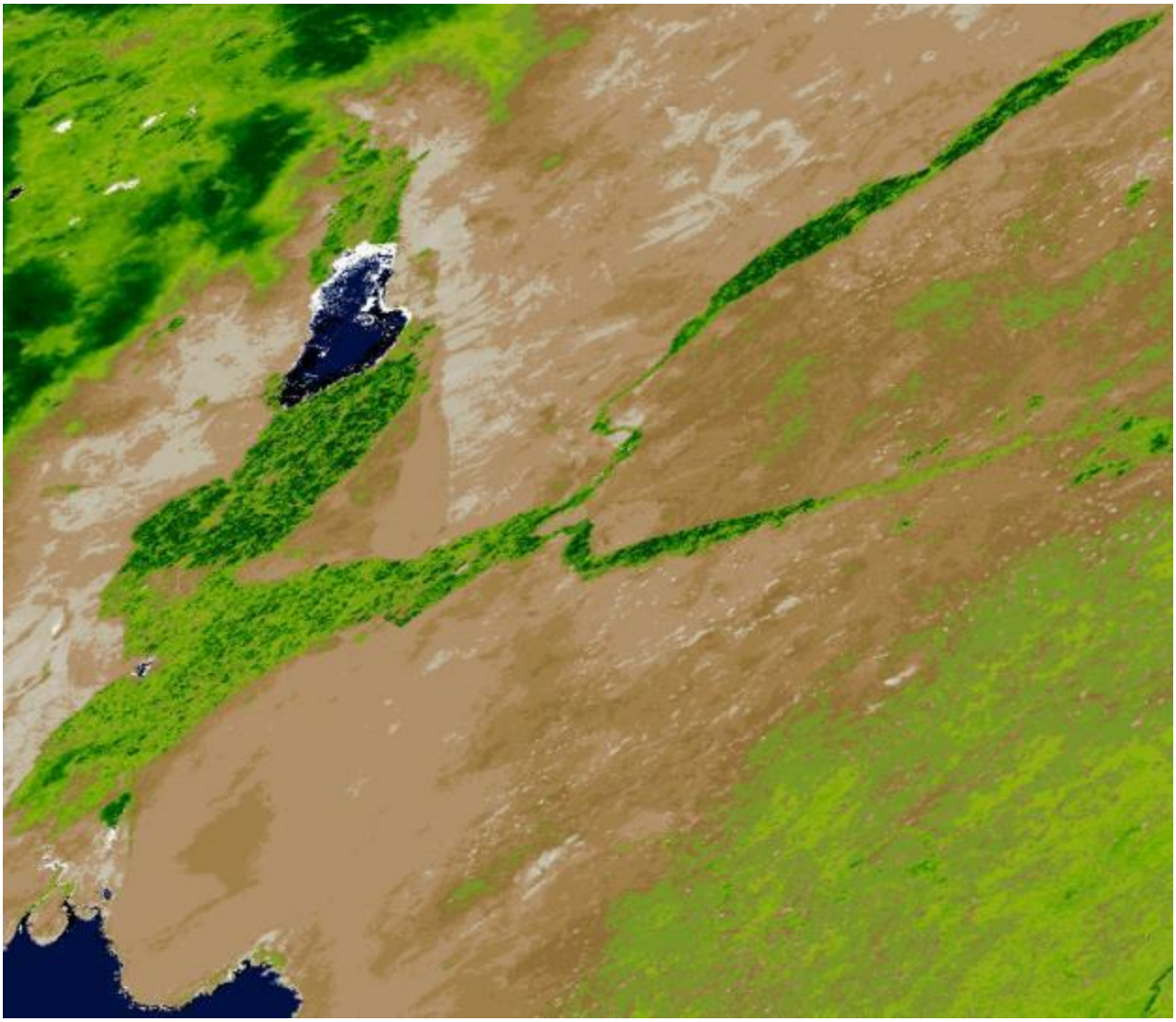


Figure 9*. Example of a 16-day MODIS 250m NDVI, ISIN Grid. This Southwest U.S.A. image shows the Imperial Valley agriculture region, the U.S. – Mexico International border, the Salton Sea, Colorado River and Gila River.* `Color scale legend.`

Figure 10. ***Example of a global 16-day MODIS 1km EVI for period 177-192 (2000).***

Color scale legend.

Figure 11. ***Example of a global 16-day MODIS 1km NDVI for period 177-192 (2000).***

Color scale legend.

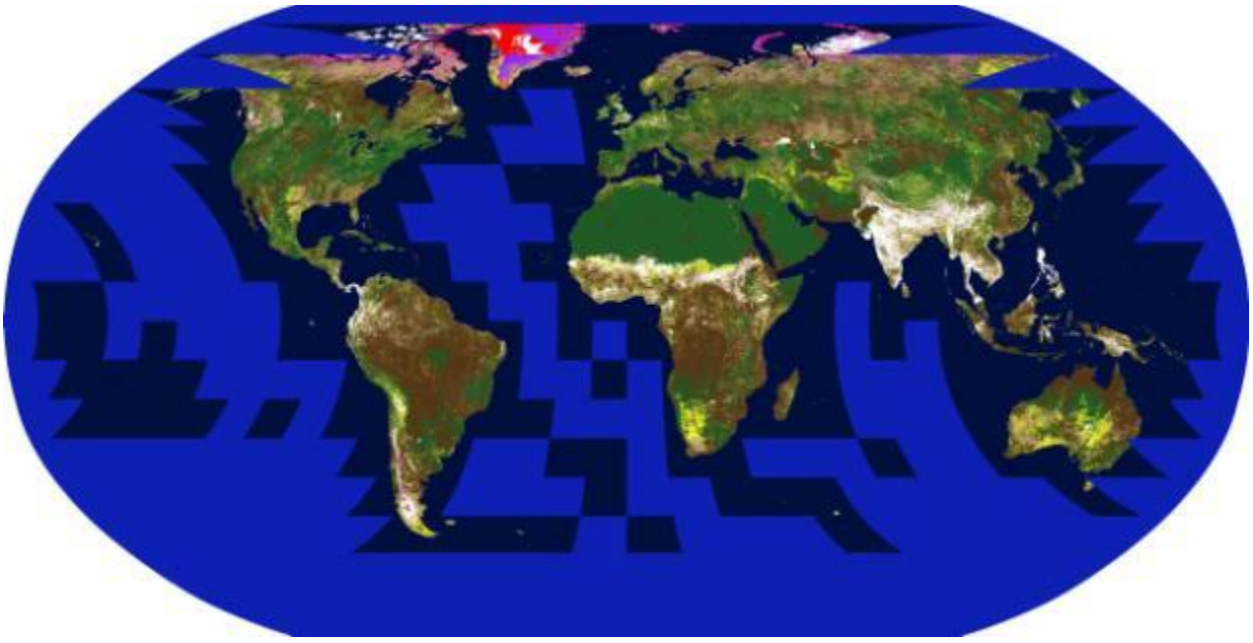


Figure 12. ***Example of a global 16-day MODIS 1km EVI QA map for period 177-192 (2000).***

Color scale legend.

No Data (Ocean, Fill Value)
No Data (No Tile)
Faulty Pixel
Cloud
Mixed Cloud
Mixed Cloud / Shadow / Snow/Ice
Mixed Cloud / Snow/Ice
Mixed Cloud / Shadow
Shadow / Snow/Ice
Snow/Ice
Shadow
Aerosol Climatology
Best Quality

QA legend.

APPENDIX 1

MOD13A1 Global and Local Metadata Attributes

Global attributes: 4

HDFEOSVersion: HDFEOS_V2.4s NDVI

StructMetadata.0: GROUP=SwathStructure

END_GROUP=SwathStructure

GROUP=GridStructure

GROUP=GRID_1

GridName="MODIS_Grid_16DAY_500m_VI"

XDim=2400

YDim=2400

UpperLeftPointMtrs=(-6671703.118599,6671703.118599)

LowerRightMtrs=(-5559752.598833,5559752.598833)

Projection=GCTP_ISINUS

ProjParams=(6371007.181000,0,0,0,0,0,0,0,21600,0,1,0,0)

SphereCode=-1

GROUP=Dimension

END_GROUP=Dimension

GROUP=DataField

OBJECT=DataField_1

DataFieldName="500m 16 days NDVI"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_1

OBJECT=DataField_2

DataFieldName="500m 16 days EVI"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_2

OBJECT=DataField_3

DataFieldName="500m 16 days NDVI Quality"

DataType=DFNT_UINT16

DimList=("YDim","XDim")

END_OBJECT=DataField_3

OBJECT=DataField_4

DataFieldName="500m 16 days EVI Quality"

DataType=DFNT_UINT16

DimList=("YDim","XDim")

END_OBJECT=DataField_4

OBJECT=DataField_5

DataFieldName="500m 16 days RED reflectance"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_5

OBJECT=DataField_6

DataFieldName="500m 16 days NIR reflectance"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_6

OBJECT=DataField_7

DataFieldName="500m 16 days BLUE reflectance"

DataType=DFNT_INT16

DimList=("YDim","XDim")

```
                    END_OBJECT=DataField_7
                    OBJECT=DataField_8
                        DataFieldName="500m 16 days MIR reflectance"
                        DataType=DFNT_INT16
                        DimList=("YDim","XDim")
                    END_OBJECT=DataField_8
                    OBJECT=DataField_9
                        DataFieldName="500m 16 days average view zenith angle"
                        DataType=DFNT_INT16
                        DimList=("YDim","XDim")
                    END_OBJECT=DataField_9
                    OBJECT=DataField_10
                        DataFieldName="500m 16 days average sun zenith angle"
                        DataType=DFNT_INT16
                        DimList=("YDim","XDim")
                    END_OBJECT=DataField_10
                    OBJECT=DataField_11
                        DataFieldName="500m 16 days average relative azimuth
angle"
                        DataType=DFNT_INT16
                        DimList=("YDim","XDim")
                    END_OBJECT=DataField_11
                END_GROUP=DataField
                GROUP=MergedFields
                END_GROUP=MergedFields
            END_GROUP=GRID_1
END_GROUP=GridStructure
GROUP=PointStructure
```

END_GROUP=PointStructure

END

CoreMetadata.0:

GROUP = INVENTORYMETADATA

GROUPTYPE = MASTERGROUP

GROUP = ECSDATAGRANULE

OBJECT = LOCALGRANULEID

NUM_VAL = 1

VALUE = "MOD13A1.A2000129.h12v03.002.2000202212444.hdf"

END_OBJECT = LOCALGRANULEID

OBJECT = PRODUCTIONDATETIME

NUM_VAL = 1

VALUE = "2000-07-21T04:24:44.000Z"

END_OBJECT = PRODUCTIONDATETIME

OBJECT = DAYNIGHTFLAG

NUM_VAL = 1

VALUE = "Both"

END_OBJECT = DAYNIGHTFLAG

OBJECT = REPROCESSINGACTUAL

NUM_VAL = 1

VALUE = "processed once"

END_OBJECT = REPROCESSINGACTUAL

OBJECT = REPROCESSINGPLANNED

NUM_VAL = 1

VALUE = "further update anticipated"

END_OBJECT = REPROCESSINGPLANNED

END_GROUP = ECSDATAGRANULE

GROUP = MEASUREDPARAMETER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "1"

GROUP = QAFLAGS

CLASS = "1"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "1"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "1"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "1"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "1"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "1"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "1"

VALUE = 1

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "1"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "1"

NUM_VAL = 1

VALUE = "500m 16 days NDVI"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "2"

GROUP = QAFLAGS

CLASS = "2"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "2"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "2"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "2"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "2"

VALUE = 1

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "2"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "2"

VALUE = 1

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "2"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

```
  END_GROUP            = QASTATS
  OBJECT               = PARAMETERNAME
    CLASS              = "2"
    NUM_VAL            = 1
    VALUE              = "500m 16 days EVI"
  END_OBJECT           = PARAMETERNAME
END_OBJECT             = MEASUREDPARAMETERCONTAINER
OBJECT                 = MEASUREDPARAMETERCONTAINER
  CLASS                = "3"
  GROUP                = QAFLAGS
    CLASS              = "3"
    OBJECT             = AUTOMATICQUALITYFLAGEXPLANATION
      NUM_VAL          = 1
      CLASS            = "3"
      VALUE            = "Product will be evaluated after launch"
    END_OBJECT         = AUTOMATICQUALITYFLAGEXPLANATION
    OBJECT             = AUTOMATICQUALITYFLAG
      NUM_VAL          = 1
      CLASS            = "3"
      VALUE            = "Suspect"
    END_OBJECT         = AUTOMATICQUALITYFLAG
  END_GROUP            = QAFLAGS
  GROUP                = QASTATS
    CLASS              = "3"
    OBJECT             = QAPERCENTMISSINGDATA
      NUM_VAL          = 1
      CLASS            = "3"
```

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "3"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "3"

VALUE = 1

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "3"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "3"

NUM_VAL = 1

VALUE = "500m 16 days NDVI Quality"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "4"

GROUP = QAFLAGS

CLASS = "4"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "4"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "4"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "4"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "4"

VALUE = 1

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "4"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "4"

VALUE = 1

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "4"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "4"

NUM_VAL = 1

VALUE = "500m 16 days EVI Quality"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "5"

GROUP = QAFLAGS

CLASS = "5"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "5"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "5"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "5"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "5"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "5"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "5"

VALUE = 1

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "5"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "5"

NUM_VAL = 1

VALUE = "500m 16 days RED reflectance"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "6"

GROUP = QAFLAGS

CLASS = "6"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "6"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "6"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "6"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "6"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "6"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "6"

VALUE = 1

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "6"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "6"

NUM_VAL = 1

VALUE = "500m 16 days NIR reflectance"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "7"

GROUP = QAFLAGS

CLASS = "7"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "7"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "7"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "7"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "7"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "7"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "7"

VALUE = 1

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "7"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "7"

NUM_VAL = 1

VALUE = "500m 16 days BLUE reflectance"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "8"

GROUP = QAFLAGS

CLASS = "8"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "8"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "8"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "8"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "8"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "8"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "8"

VALUE = 1

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "8"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "8"

NUM_VAL = 1

VALUE = "500m 16 days MIR reflectance"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "9"

GROUP = QAFLAGS

CLASS = "9"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "9"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "9"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "9"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "9"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "9"

VALUE = 0

```
    END_OBJECT            = QAPERCENTOUTOFBOUNDSDATA
    OBJECT                = QAPERCENTCLOUDCOVER
      NUM_VAL             = 1
      CLASS               = "9"
      VALUE               = 1
    END_OBJECT            = QAPERCENTCLOUDCOVER
    OBJECT                = QAPERCENTINTERPOLATEDDATA
      NUM_VAL             = 1
      CLASS               = "9"
      VALUE               = 0
    END_OBJECT            = QAPERCENTINTERPOLATEDDATA
  END_GROUP               = QASTATS
  OBJECT                  = PARAMETERNAME
    CLASS                 = "9"
    NUM_VAL               = 1
    VALUE                 = "500m 16 days average view zenith angle"
  END_OBJECT              = PARAMETERNAME
END_OBJECT                = MEASUREDPARAMETERCONTAINER
OBJECT                    = MEASUREDPARAMETERCONTAINER
  CLASS                   = "10"
  GROUP                   = QAFLAGS
    CLASS                 = "1"
    OBJECT                = AUTOMATICQUALITYFLAGEXPLANATION
      NUM_VAL             = 1
      CLASS               = "10"
      VALUE               = "Product will be evaluated after launch"
    END_OBJECT            = AUTOMATICQUALITYFLAGEXPLANATION
```

```
  OBJECT                = AUTOMATICQUALITYFLAG
    NUM_VAL             = 1
    CLASS               = "10"
    VALUE               = "Suspect"
  END_OBJECT            = AUTOMATICQUALITYFLAG
END_GROUP               = QAFLAGS
GROUP                   = QASTATS
  CLASS                 = "1"
  OBJECT                = QAPERCENTMISSINGDATA
    NUM_VAL             = 1
    CLASS               = "10"
    VALUE               = 0
  END_OBJECT            = QAPERCENTMISSINGDATA
  OBJECT                = QAPERCENTOUTOFBOUNDSDATA
    NUM_VAL             = 1
    CLASS               = "10"
    VALUE               = 0
  END_OBJECT            = QAPERCENTOUTOFBOUNDSDATA
  OBJECT                = QAPERCENTCLOUDCOVER
    NUM_VAL             = 1
    CLASS               = "10"
    VALUE               = 1
  END_OBJECT            = QAPERCENTCLOUDCOVER
  OBJECT                = QAPERCENTINTERPOLATEDDATA
    NUM_VAL             = 1
    CLASS               = "10"
    VALUE               = 0
```

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "10"

NUM_VAL = 1

VALUE = "500m 16 days average sun zenith angle"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "11"

GROUP = QAFLAGS

CLASS = "1"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "11"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "11"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "1"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "11"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "11"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "11"

VALUE = 1

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "11"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "11"

NUM_VAL = 1

VALUE = "500m 16 days average relative azimuth angle"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

END_GROUP = MEASUREDPARAMETER

GROUP = COLLECTIONDESCRIPTIONCLASS

```
  OBJECT                = VERSIONID
    NUM_VAL             = 1
    VALUE               = 1
  END_OBJECT            = VERSIONID
  OBJECT                = SHORTNAME
    NUM_VAL             = 1
    VALUE               = "MOD13A1"
  END_OBJECT            = SHORTNAME
 END_GROUP              = COLLECTIONDESCRIPTIONCLASS
 GROUP                  = INPUTGRANULE
  OBJECT                = INPUTPOINTER
    NUM_VAL             = 160
    VALUE               = ("MOD09GHK.A2000129.h12v03.001.2000141075429.hdf",
"MOD09GHK.A2000130.h12v03.001.2000142041234.hdf",
"MOD09GHK.A2000132.h12v03.001.2000160053350.hdf",
"MOD09GHK.A2000134.h12v03.001.2000144220328.hdf",
"MOD09GHK.A2000135.h12v03.001.2000154031029.hdf", "

        MOD09GHK.A2000136.h12v03.001.2000158082455.hdf",
"MOD09GHK.A2000138.h12v03.001.2000153185705.hdf",
"MOD09GHK.A2000140.h12v03.001.2000147061411.hdf",
"MOD09GHK.A2000141.h12v03.001.2000161002506.hdf",
"MOD09GHK.A2000142.h12v03.001.2000148130723.hdf", "

        MOD09GHK.A2000143.h12v03.001.2000149081545.hdf",
"MOD09GHK.A2000144.h12v03.001.2000149230504.hdf",
"MODPTHKM.A2000129.h12v03.001.2000141073858.hdf",
"MODPTHKM.A2000130.h12v03.001.2000142040658.hdf",
"MODPTHKM.A2000132.h12v03.001.2000160051253.hdf", "

        MODPTHKM.A2000134.h12v03.001.2000144215620.hdf",
"MODPTHKM.A2000135.h12v03.001.2000154025448.hdf",
"MODPTHKM.A2000136.h12v03.001.2000158081928.hdf",
"MODPTHKM.A2000138.h12v03.001.2000153182654.hdf",
"MODPTHKM.A2000140.h12v03.001.2000147060121.hdf", "

        MODPTHKM.A2000141.h12v03.001.2000161002034.hdf",
"MODPTHKM.A2000142.h12v03.001.2000148124614.hdf",
"MODPTHKM.A2000143.h12v03.001.2000149073716.hdf",
"MODPTHKM.A2000144.h12v03.001.2000149225454.hdf",
"MOD09GST.A2000129.h12v03.001.2000141074039.hdf", "

        MOD09GST.A2000130.h12v03.001.2000142040805.hdf",
"MOD09GST.A2000132.h12v03.001.2000160051656.hdf",
```

"MOD09GST.A2000134.h12v03.001.2000144215648.hdf",
"MOD09GST.A2000135.h12v03.001.2000154025947.hdf",
"MOD09GST.A2000136.h12v03.001.2000158082022.hdf", "

MOD09GST.A2000138.h12v03.001.2000153183355.hdf",
"MOD09GST.A2000140.h12v03.001.2000147060458.hdf",
"MOD09GST.A2000141.h12v03.001.2000161002222.hdf",
"MOD09GST.A2000142.h12v03.001.2000148125032.hdf",
"MOD09GST.A2000143.h12v03.001.2000149074236.hdf", "

MOD09GST.A2000144.h12v03.001.2000149225650.hdf",
"MODMGGAD.A2000129.h12v03.001.2000141074013.hdf",
"MODMGGAD.A2000130.h12v03.001.2000142040725.hdf",
"MODMGGAD.A2000132.h12v03.001.2000160051520.hdf",
"MODMGGAD.A2000134.h12v03.001.2000144215630.hdf", "

MODMGGAD.A2000135.h12v03.001.2000154025805.hdf",
"MODMGGAD.A2000136.h12v03.001.2000158081952.hdf",
"MODMGGAD.A2000138.h12v03.001.2000153182947.hdf",
"MODMGGAD.A2000140.h12v03.001.2000147060323.hdf",
"MODMGGAD.A2000141.h12v03.001.2000161002052.hdf", "

MODMGGAD.A2000142.h12v03.001.2000148124812.hdf",
"MODMGGAD.A2000143.h12v03.001.2000149074004.hdf",
"MODMGGAD.A2000144.h12v03.001.2000149225558.hdf")

END_OBJECT = INPUTPOINTER

END_GROUP = INPUTGRANULE

GROUP = SPATIALDOMAINCONTAINER

GROUP = HORIZONTALSPATIALDOMAINCONTAINER

GROUP = GPOLYGON

OBJECT = GPOLYGONCONTAINER

CLASS = "1"

GROUP = GRINGPOINT

CLASS = "1"

OBJECT = GRINGPOINTLONGITUDE

NUM_VAL = 4

CLASS = "1"

VALUE = (-119.975003, -99.977781, -77.792984, -93.351581)

END_OBJECT = GRINGPOINTLONGITUDE

OBJECT = GRINGPOINTLATITUDE

```
          NUM_VAL            = 4
          CLASS              = "1"
          VALUE              = (60.000000, 60.000000, 50.000000, 50.000000)
        END_OBJECT           = GRINGPOINTLATITUDE
        OBJECT               = GRINGPOINTSEQUENCENO
          NUM_VAL            = 4
          CLASS              = "1"
          VALUE              = (1, 2, 3, 4)
        END_OBJECT           = GRINGPOINTSEQUENCENO
      END_GROUP              = GRINGPOINT
      GROUP                  = GRING
        CLASS                = "1"
        OBJECT               = EXCLUSIONGRINGFLAG
          NUM_VAL            = 1
          CLASS              = "1"
          VALUE              = "N"
        END_OBJECT           = EXCLUSIONGRINGFLAG
      END_GROUP              = GRING
    END_OBJECT               = GPOLYGONCONTAINER
  END_GROUP                  = GPOLYGON
 END_GROUP                   = HORIZONTALSPATIALDOMAINCONTAINER
END_GROUP                    = SPATIALDOMAINCONTAINER
GROUP                        = RANGEDATETIME
 OBJECT                      = RANGEENDINGDATE
  NUM_VAL                    = 1
  VALUE                      = "2000-05-23"
 END_OBJECT                  = RANGEENDINGDATE
```

```
 OBJECT              = RANGEENDINGTIME
  NUM_VAL            = 1
  VALUE              = "20:00:00.000000"
 END_OBJECT          = RANGEENDINGTIME
 OBJECT              = RANGEBEGINNINGDATE
  NUM_VAL            = 1
  VALUE              = "2000-05-08"
 END_OBJECT          = RANGEBEGINNINGDATE
 OBJECT              = RANGEBEGINNINGTIME
  NUM_VAL            = 1
  VALUE              = "07:10:00.000000"
 END_OBJECT          = RANGEBEGINNINGTIME
END_GROUP            = RANGEDATETIME
GROUP                = PGEVERSIONCLASS
 OBJECT              = PGEVERSION
  NUM_VAL            = 1
  VALUE              = "2.2.1"
 END_OBJECT          = PGEVERSION
END_GROUP            = PGEVERSIONCLASS
GROUP                = ASSOCIATEDPLATFORMINSTRUMENTSENSOR
 OBJECT              = ASSOCIATEDPLATFORMINSTRUMENTSENSORCONTAINER
  CLASS              = "1"
  OBJECT             = ASSOCIATEDSENSORSHORTNAME
   CLASS             = "1"
   NUM_VAL           = 1
   VALUE             = "CCD"
  END_OBJECT         = ASSOCIATEDSENSORSHORTNAME
```

OBJECT = ASSOCIATEDPLATFORMSHORTNAME

CLASS = "1"

NUM_VAL = 1

VALUE = "AM-1"

END_OBJECT = ASSOCIATEDPLATFORMSHORTNAME

OBJECT = ASSOCIATEDINSTRUMENTSHORTNAME

CLASS = "1"

NUM_VAL = 1

VALUE = "MODIS"

END_OBJECT = ASSOCIATEDINSTRUMENTSHORTNAME

END_OBJECT = ASSOCIATEDPLATFORMINSTRUMENTSENSORCONTAINER

END_GROUP = ASSOCIATEDPLATFORMINSTRUMENTSENSOR

GROUP = ADDITIONALATTRIBUTES

OBJECT = ADDITIONALATTRIBUTESCONTAINER

CLASS = "1"

OBJECT = ADDITIONALATTRIBUTENAME

CLASS = "1"

NUM_VAL = 1

VALUE = "QAPERCENTGOODQUALITY"

END_OBJECT = ADDITIONALATTRIBUTENAME

GROUP = INFORMATIONCONTENT

CLASS = "1"

OBJECT = PARAMETERVALUE

NUM_VAL = 1

CLASS = "1"

VALUE = "0"

END_OBJECT = PARAMETERVALUE

```
 END_GROUP            = INFORMATIONCONTENT
END_OBJECT            = ADDITIONALATTRIBUTESCONTAINER
OBJECT                = ADDITIONALATTRIBUTESCONTAINER
 CLASS              = "2"
 OBJECT               = ADDITIONALATTRIBUTENAME
  CLASS               = "2"
  NUM_VAL             = 1
  VALUE               = "QAPERCENTOTHERQUALITY"
 END_OBJECT           = ADDITIONALATTRIBUTENAME
 GROUP                = INFORMATIONCONTENT
  CLASS               = "2"
  OBJECT               = PARAMETERVALUE
   NUM_VAL             = 1
   CLASS               = "2"
   VALUE               = "100"
  END_OBJECT           = PARAMETERVALUE
 END_GROUP            = INFORMATIONCONTENT
END_OBJECT            = ADDITIONALATTRIBUTESCONTAINER
OBJECT                = ADDITIONALATTRIBUTESCONTAINER
 CLASS              = "3"
 OBJECT               = ADDITIONALATTRIBUTENAME
  CLASS               = "3"
  NUM_VAL             = 1
  VALUE               = "QAPERCENTNOTPRODUCEDCLOUD"
 END_OBJECT           = ADDITIONALATTRIBUTENAME
 GROUP                = INFORMATIONCONTENT
  CLASS               = "3"
```

```
    OBJECT                = PARAMETERVALUE
     NUM_VAL              = 1
     CLASS                = "3"
     VALUE                = "0"
    END_OBJECT            = PARAMETERVALUE
   END_GROUP              = INFORMATIONCONTENT
  END_OBJECT              = ADDITIONALATTRIBUTESCONTAINER
  OBJECT                  = ADDITIONALATTRIBUTESCONTAINER
   CLASS                  = "4"
   OBJECT                 = ADDITIONALATTRIBUTENAME
    CLASS                 = "4"
    NUM_VAL               = 1
    VALUE                 = "QAPERCENTNOTPRODUCEDOTHER"
   END_OBJECT             = ADDITIONALATTRIBUTENAME
   GROUP                  = INFORMATIONCONTENT
    CLASS                 = "4"
    OBJECT                = PARAMETERVALUE
     NUM_VAL              = 1
     CLASS                = "4"
     VALUE                = "0"
    END_OBJECT            = PARAMETERVALUE
   END_GROUP              = INFORMATIONCONTENT
  END_OBJECT              = ADDITIONALATTRIBUTESCONTAINER
  OBJECT                  = ADDITIONALATTRIBUTESCONTAINER
   CLASS                  = "5"
   OBJECT                 = ADDITIONALATTRIBUTENAME
    CLASS                 = "5"
```

NUM_VAL = 1

VALUE = "NDVI500M16DAYQCLASSPERCENTAGE"

END_OBJECT = ADDITIONALATTRIBUTENAME

GROUP = INFORMATIONCONTENT

CLASS = "5"

OBJECT = PARAMETERVALUE

NUM_VAL = 1

CLASS = "5"

VALUE = "0"

END_OBJECT = PARAMETERVALUE

END_GROUP = INFORMATIONCONTENT

END_OBJECT = ADDITIONALATTRIBUTESCONTAINER

OBJECT = ADDITIONALATTRIBUTESCONTAINER

CLASS = "6"

OBJECT = ADDITIONALATTRIBUTENAME

CLASS = "6"

NUM_VAL = 1

VALUE = "EVI500M16DAYQCLASSPERCENTAGE"

END_OBJECT = ADDITIONALATTRIBUTENAME

GROUP = INFORMATIONCONTENT

CLASS = "6"

OBJECT = PARAMETERVALUE

NUM_VAL = 1

CLASS = "6"

VALUE = "0"

END_OBJECT = PARAMETERVALUE

END_GROUP = INFORMATIONCONTENT

```
END_OBJECT          = ADDITIONALATTRIBUTESCONTAINER
OBJECT              = ADDITIONALATTRIBUTESCONTAINER
 CLASS              = "7"
 OBJECT             = ADDITIONALATTRIBUTENAME
  CLASS             = "7"
  NUM_VAL           = 1
  VALUE             = "HORIZONTALTILENUMBER"
 END_OBJECT         = ADDITIONALATTRIBUTENAME
 GROUP              = INFORMATIONCONTENT
  CLASS             = "7"
  OBJECT            = PARAMETERVALUE
   NUM_VAL          = 1
   CLASS            = "7"
   VALUE            = "12"
  END_OBJECT        = PARAMETERVALUE
 END_GROUP          = INFORMATIONCONTENT
END_OBJECT          = ADDITIONALATTRIBUTESCONTAINER
OBJECT              = ADDITIONALATTRIBUTESCONTAINER
 CLASS              = "8"
 OBJECT             = ADDITIONALATTRIBUTENAME
  CLASS             = "8"
  NUM_VAL           = 1
  VALUE             = "VERTICALTILENUMBER"
 END_OBJECT         = ADDITIONALATTRIBUTENAME
 GROUP              = INFORMATIONCONTENT
  CLASS             = "8"
  OBJECT            = PARAMETERVALUE
```

```
      NUM_VAL            = 1
      CLASS              = "8"
      VALUE              = "03"
    END_OBJECT           = PARAMETERVALUE
  END_GROUP              = INFORMATIONCONTENT
END_OBJECT               = ADDITIONALATTRIBUTESCONTAINER
OBJECT                   = ADDITIONALATTRIBUTESCONTAINER
  CLASS                  = "9"
  OBJECT                 = ADDITIONALATTRIBUTENAME
    CLASS                = "9"
    NUM_VAL              = 1
    VALUE                = "TileID"
  END_OBJECT             = ADDITIONALATTRIBUTENAME
  GROUP                  = INFORMATIONCONTENT
    CLASS                = "9"
    OBJECT               = PARAMETERVALUE
      NUM_VAL            = 1
      CLASS              = "9"
      VALUE              = "11012003"
    END_OBJECT           = PARAMETERVALUE
  END_GROUP              = INFORMATIONCONTENT
END_OBJECT               = ADDITIONALATTRIBUTESCONTAINER
OBJECT                   = ADDITIONALATTRIBUTESCONTAINER
  CLASS                  = "10"
  OBJECT                 = ADDITIONALATTRIBUTENAME
    CLASS                = "10"
    NUM_VAL              = 1
```

VALUE = "PRODUCTRESOLUTION"

END_OBJECT = ADDITIONALATTRIBUTENAME

GROUP = INFORMATIONCONTENT

CLASS = "1"

OBJECT = PARAMETERVALUE

NUM_VAL = 1

CLASS = "10"

VALUE = "500m Product resolution"

END_OBJECT = PARAMETERVALUE

END_GROUP = INFORMATIONCONTENT

END_OBJECT = ADDITIONALATTRIBUTESCONTAINER

END_GROUP = ADDITIONALATTRIBUTES

END_GROUP = INVENTORYMETADATA

END

ArchiveMetadata.0:

GROUP = ARCHIVEDMETADATA

GROUPTYPE = MASTERGROUP

OBJECT = CHARACTERISTICBINANGULARSIZE

NUM_VAL = 1

VALUE = 15.000000

END_OBJECT = CHARACTERISTICBINANGULARSIZE

OBJECT = CHARACTERISTICBINSIZE

NUM_VAL = 1

VALUE = 463.312717

END_OBJECT = CHARACTERISTICBINSIZE

OBJECT = DATACOLUMNS

NUM_VAL = 1

VALUE = 2400

END_OBJECT = DATACOLUMNS

OBJECT = DATAROWS

NUM_VAL = 1

VALUE = 2400

END_OBJECT = DATAROWS

OBJECT = GLOBALGRIDCOLUMNS

NUM_VAL = 1

VALUE = 86400

END_OBJECT = GLOBALGRIDCOLUMNS

OBJECT = GLOBALGRIDROWS

NUM_VAL = 1

VALUE = 43200

END_OBJECT = GLOBALGRIDROWS

OBJECT = NUMBEROFDAYS

NUM_VAL = 1

VALUE = 12

END_OBJECT = NUMBEROFDAYS

OBJECT = DAYSOFYEAR

NUM_VAL = 16

VALUE = (129, 130, 132, 134, 135, 136, 138, 140, 141, 142, 143, 144, -1, -1, -1, -1)

END_OBJECT = DAYSOFYEAR

OBJECT = GEOANYABNORMAL

NUM_VAL = 1

VALUE = "True"

END_OBJECT = GEOANYABNORMAL

OBJECT = GEOESTMAXRMSERROR

NUM_VAL = 1

VALUE = 500.000000

END_OBJECT = GEOESTMAXRMSERROR

OBJECT = SPSOPARAMETERS

NUM_VAL = 4

VALUE = ("2749", "4334", "2749a", "4334a")

END_OBJECT = SPSOPARAMETERS

OBJECT = ALGORITHMPACKAGEACCEPTANCEDATE

NUM_VAL = 1

VALUE = "1998-01-01"

END_OBJECT = ALGORITHMPACKAGEACCEPTANCEDATE

OBJECT = ALGORITHMPACKAGEMATURITYCODE

NUM_VAL = 1

VALUE = "LAUNCH"

END_OBJECT = ALGORITHMPACKAGEMATURITYCODE

OBJECT = ALGORITHMPACKAGENAME

NUM_VAL = 1

VALUE = "MOD13A1"

END_OBJECT = ALGORITHMPACKAGENAME

OBJECT = ALGORITHMPACKAGEVERSION

NUM_VAL = 1

VALUE = "2"

END_OBJECT = ALGORITHMPACKAGEVERSION

OBJECT = INSTRUMENTNAME

NUM_VAL = 1

VALUE = "Moderate-Resolution Imaging SpectroRadiometer"

END_OBJECT = INSTRUMENTNAME

OBJECT = LONGNAME

```
  NUM_VAL            = 1

  VALUE              = "MODIS Vegetation Index (16 day 250m/500m)"

END_OBJECT           = LONGNAME

OBJECT               = PROCESSINGCENTER

  NUM_VAL            = 1

  VALUE              = "MODAPS"

END_OBJECT           = PROCESSINGCENTER

OBJECT               = INPUTFILENAME

  NUM_VAL            = 160

  VALUE              = ("MOD09GHK.A2000129.h12v03.001.2000141075429.hdf",
"MOD09GHK.A2000130.h12v03.001.2000142041234.hdf",
"MOD09GHK.A2000132.h12v03.001.2000160053350.hdf",
"MOD09GHK.A2000134.h12v03.001.2000144220328.hdf",
"MOD09GHK.A2000135.h12v03.001.2000154031029.hdf", "

      MOD09GHK.A2000136.h12v03.001.2000158082455.hdf",
"MOD09GHK.A2000138.h12v03.001.2000153185705.hdf",
"MOD09GHK.A2000140.h12v03.001.2000147061411.hdf",
"MOD09GHK.A2000141.h12v03.001.2000161002506.hdf",
"MOD09GHK.A2000142.h12v03.001.2000148130723.hdf", "

      MOD09GHK.A2000143.h12v03.001.2000149081545.hdf",
"MOD09GHK.A2000144.h12v03.001.2000149230504.hdf",
"MODPTHKM.A2000129.h12v03.001.2000141073858.hdf",
"MODPTHKM.A2000130.h12v03.001.2000142040658.hdf",
"MODPTHKM.A2000132.h12v03.001.2000160051253.hdf", "

      MODPTHKM.A2000134.h12v03.001.2000144215620.hdf",
"MODPTHKM.A2000135.h12v03.001.2000154025448.hdf",
"MODPTHKM.A2000136.h12v03.001.2000158081928.hdf",
"MODPTHKM.A2000138.h12v03.001.2000153182654.hdf",
"MODPTHKM.A2000140.h12v03.001.2000147060121.hdf", "

      MODPTHKM.A2000141.h12v03.001.2000161002034.hdf",
"MODPTHKM.A2000142.h12v03.001.2000148124614.hdf",
"MODPTHKM.A2000143.h12v03.001.2000149073716.hdf",
"MODPTHKM.A2000144.h12v03.001.2000149225454.hdf",
"MOD09GST.A2000129.h12v03.001.2000141074039.hdf", "

      MOD09GST.A2000130.h12v03.001.2000142040805.hdf",
"MOD09GST.A2000132.h12v03.001.2000160051656.hdf",
"MOD09GST.A2000134.h12v03.001.2000144215648.hdf",
"MOD09GST.A2000135.h12v03.001.2000154025947.hdf",
"MOD09GST.A2000136.h12v03.001.2000158082022.hdf", "

      MOD09GST.A2000138.h12v03.001.2000153183355.hdf",
"MOD09GST.A2000140.h12v03.001.2000147060458.hdf",
"MOD09GST.A2000141.h12v03.001.2000161002222.hdf",
```

"MOD09GST.A2000142.h12v03.001.2000148125032.hdf",
"MOD09GST.A2000143.h12v03.001.2000149074236.hdf", "

MOD09GST.A2000144.h12v03.001.2000149225650.hdf",
"MODMGGAD.A2000129.h12v03.001.2000141074013.hdf",
"MODMGGAD.A2000130.h12v03.001.2000142040725.hdf",
"MODMGGAD.A2000132.h12v03.001.2000160051520.hdf",
"MODMGGAD.A2000134.h12v03.001.2000144215630.hdf", "

MODMGGAD.A2000135.h12v03.001.2000154025805.hdf",
"MODMGGAD.A2000136.h12v03.001.2000158081952.hdf",
"MODMGGAD.A2000138.h12v03.001.2000153182947.hdf",
"MODMGGAD.A2000140.h12v03.001.2000147060323.hdf",
"MODMGGAD.A2000141.h12v03.001.2000161002052.hdf", "

MODMGGAD.A2000142.h12v03.001.2000148124812.hdf",
"MODMGGAD.A2000143.h12v03.001.2000149074004.hdf",
"MODMGGAD.A2000144.h12v03.001.2000149225558.hdf")

END_OBJECT = INPUTFILENAME

OBJECT = QAPERCENTPOORQ250MOR500M16DAYNDVI

NUM_VAL = 16

VALUE = (0, 0, 0, 0, 50, 19, 24, 5, 0, 2, 0, 0, 0, 0, 0, 0)

END_OBJECT = QAPERCENTPOORQ250MOR500M16DAYNDVI

OBJECT = QAPERCENTPOORQ250MOR500M16DAYEVI

NUM_VAL = 16

VALUE = (0, 0, 0, 0, 49, 19, 24, 5, 0, 2, 0, 0, 0, 0, 0, 1)

END_OBJECT = QAPERCENTPOORQ250MOR500M16DAYEVI

GROUP = BOUNDINGRECTANGLE

OBJECT = NORTHBOUNDINGCOORDINATE

NUM_VAL = 1

VALUE = 60.000000

END_OBJECT = NORTHBOUNDINGCOORDINATE

OBJECT = SOUTHBOUNDINGCOORDINATE

NUM_VAL = 1

VALUE = 50.000000

END_OBJECT = SOUTHBOUNDINGCOORDINATE

```
    OBJECT                = EASTBOUNDINGCOORDINATE
      NUM_VAL             = 1
      VALUE               = -77.792984
    END_OBJECT            = EASTBOUNDINGCOORDINATE
    OBJECT                = WESTBOUNDINGCOORDINATE
      NUM_VAL             = 1
      VALUE               = -119.975003
    END_OBJECT            = WESTBOUNDINGCOORDINATE
  END_GROUP               = BOUNDINGRECTANGLE
  OBJECT                  = PERCENTLAND
    NUM_VAL               = 1
    VALUE                 = 100
  END_OBJECT              = PERCENTLAND
  OBJECT                  = SEAPROCESSED
    NUM_VAL               = 1
    VALUE                 = "Yes"
  END_OBJECT              = SEAPROCESSED
  OBJECT                  = DESCRREVISION
    NUM_VAL               = 1
    VALUE                 = "1.0"
  END_OBJECT              = DESCRREVISION
END_GROUP                 = ARCHIVEDMETADATA
END
```

APPENDIX 2

MOD13A2 Global and Local Metadata Attributes

Structural Metdata

StructMetadata.0: GROUP=SwathStructure

END_GROUP=SwathStructure

GROUP=GridStructure

GROUP=GRID_1

GridName="MODIS_Grid_16DAY_1km_VI"

XDim=1200

YDim=1200

UpperLeftPointMtrs=(-6671703.118599,6671703.118599)

LowerRightMtrs=(-5559752.598833,5559752.598833)

Projection=GCTP_ISINUS

ProjParams=(6371007.181000,0,0,0,0,0,0,0,21600,0,1,0,0)

SphereCode=-1

GROUP=Dimension

END_GROUP=Dimension

GROUP=DataField

OBJECT=DataField_1

DataFieldName="1 km 16 days NDVI"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_1

OBJECT=DataField_2

DataFieldName="1 km 16 days EVI"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_2

OBJECT=DataField_3

DataFieldName="1 km 16 days NDVI Quality"

DataType=DFNT_UINT16

DimList=("YDim","XDim")

END_OBJECT=DataField_3

OBJECT=DataField_4

DataFieldName="1 km 16 days EVI Quality"

DataType=DFNT_UINT16

DimList=("YDim","XDim")

END_OBJECT=DataField_4

OBJECT=DataField_5

DataFieldName="1 km 16 days red reflectance"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_5

OBJECT=DataField_6

DataFieldName="1 km 16 days NIR reflectance"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_6

OBJECT=DataField_7

DataFieldName="1 km 16 days blue reflectance"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_7

OBJECT=DataField_8

DataFieldName="1 km 16 days MIR reflectance"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_8

OBJECT=DataField_9

DataFieldName="1 km 16 days average view zenith angle"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_9

OBJECT=DataField_10

DataFieldName="1 km 16 days average sun zenith angle"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_10

OBJECT=DataField_11

DataFieldName="1 km 16 days average relative azimuth angle"

DataType=DFNT_INT16

DimList=("YDim","XDim")

END_OBJECT=DataField_11

END_GROUP=DataField

GROUP=MergedFields

END_GROUP=MergedFields

END_GROUP=GRID_1

END_GROUP=GridStructure

GROUP=PointStructure

END_GROUP=PointStructure

END

CoreMetadata

Inventory Metdata

GROUP = INVENTORYMETADATA

GROUPTYPE = MASTERGROUP

GROUP = ECSDATAGRANULE

OBJECT = LOCALGRANULEID

NUM_VAL = 1

VALUE = "MOD13A2.A2000129.h12v03.002.2000172115628.hdf"

END_OBJECT = LOCALGRANULEID

OBJECT = PRODUCTIONDATETIME

NUM_VAL = 1

VALUE = "2000-06-20T15:56:28.000Z"

END_OBJECT = PRODUCTIONDATETIME

OBJECT = DAYNIGHTFLAG

NUM_VAL = 1

VALUE = "Both"

END_OBJECT = DAYNIGHTFLAG

OBJECT = REPROCESSINGACTUAL

NUM_VAL = 1

VALUE = "processed once"

END_OBJECT = REPROCESSINGACTUAL

OBJECT = REPROCESSINGPLANNED

NUM_VAL = 1

VALUE = "further update anticipated"

END_OBJECT = REPROCESSINGPLANNED

END_GROUP = ECSDATAGRANULE

GROUP = MEASUREDPARAMETER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "1"

GROUP = QAFLAGS

CLASS = "1"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "1"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "1"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "1"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "1"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "1"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "1"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "1"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "1"

NUM_VAL = 1

VALUE = "1 km 16 days NDVI"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "2"

GROUP = QAFLAGS

CLASS = "2"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "2"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "2"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "2"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "2"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "2"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "2"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "2"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "2"

NUM_VAL = 1

VALUE = "1 km 16 days EVI"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "3"

GROUP = QAFLAGS

CLASS = "3"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "3"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "3"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "3"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "3"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "3"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "3"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "3"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "3"

NUM_VAL = 1

VALUE = "1 km 16 days NDVI Quality"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "4"

GROUP = QAFLAGS

CLASS = "4"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "4"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "4"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "4"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "4"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "4"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "4"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "4"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "4"

NUM_VAL = 1

VALUE = "1 km 16 days EVI Quality"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "5"

GROUP = QAFLAGS

CLASS = "5"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "5"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "5"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "5"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "5"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "5"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "5"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "5"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "5"

NUM_VAL = 1

VALUE = "1 km 16 days red reflectance"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "6"

GROUP = QAFLAGS

CLASS = "6"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "6"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "6"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "6"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "6"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "6"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "6"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "6"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "6"

NUM_VAL = 1

VALUE = "1 km 16 days NIR reflectance"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "7"

GROUP = QAFLAGS

CLASS = "7"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "7"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "7"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "7"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "7"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "7"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "7"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "7"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "7"

NUM_VAL = 1

VALUE = "1 km 16 days blue reflectance"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "8"

GROUP = QAFLAGS

CLASS = "8"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "8"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "8"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "8"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "8"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "8"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "8"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "8"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "8"

NUM_VAL = 1

VALUE = "1 km 16 days MIR reflectance"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "9"

GROUP = QAFLAGS

CLASS = "9"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "9"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "9"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "9"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "9"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "9"

VALUE = 0

```
    END_OBJECT            = QAPERCENTOUTOFBOUNDSDATA
    OBJECT                = QAPERCENTCLOUDCOVER
      NUM_VAL             = 1
      CLASS               = "9"
      VALUE               = 15
    END_OBJECT            = QAPERCENTCLOUDCOVER
    OBJECT                = QAPERCENTINTERPOLATEDDATA
      NUM_VAL             = 1
      CLASS               = "9"
      VALUE               = 0
    END_OBJECT            = QAPERCENTINTERPOLATEDDATA
  END_GROUP               = QASTATS
  OBJECT                  = PARAMETERNAME
    CLASS                 = "9"
    NUM_VAL               = 1
    VALUE                 = "1 km 16 days average view zenith angle"
  END_OBJECT              = PARAMETERNAME
END_OBJECT                = MEASUREDPARAMETERCONTAINER
OBJECT                    = MEASUREDPARAMETERCONTAINER
  CLASS                   = "10"
  GROUP                   = QAFLAGS
    CLASS                 = "1"
    OBJECT                = AUTOMATICQUALITYFLAGEXPLANATION
      NUM_VAL             = 1
      CLASS               = "10"
      VALUE               = "Product will be evaluated after launch"
    END_OBJECT            = AUTOMATICQUALITYFLAGEXPLANATION
```

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "10"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "1"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "10"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "10"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "10"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "10"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "10"

NUM_VAL = 1

VALUE = "1 km 16 days average sun zenith angle"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

OBJECT = MEASUREDPARAMETERCONTAINER

CLASS = "11"

GROUP = QAFLAGS

CLASS = "1"

OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

NUM_VAL = 1

CLASS = "11"

VALUE = "Product will be evaluated after launch"

END_OBJECT = AUTOMATICQUALITYFLAGEXPLANATION

OBJECT = AUTOMATICQUALITYFLAG

NUM_VAL = 1

CLASS = "11"

VALUE = "Suspect"

END_OBJECT = AUTOMATICQUALITYFLAG

END_GROUP = QAFLAGS

GROUP = QASTATS

CLASS = "1"

OBJECT = QAPERCENTMISSINGDATA

NUM_VAL = 1

CLASS = "11"

VALUE = 0

END_OBJECT = QAPERCENTMISSINGDATA

OBJECT = QAPERCENTOUTOFBOUNDSDATA

NUM_VAL = 1

CLASS = "11"

VALUE = 0

END_OBJECT = QAPERCENTOUTOFBOUNDSDATA

OBJECT = QAPERCENTCLOUDCOVER

NUM_VAL = 1

CLASS = "11"

VALUE = 15

END_OBJECT = QAPERCENTCLOUDCOVER

OBJECT = QAPERCENTINTERPOLATEDDATA

NUM_VAL = 1

CLASS = "11"

VALUE = 0

END_OBJECT = QAPERCENTINTERPOLATEDDATA

END_GROUP = QASTATS

OBJECT = PARAMETERNAME

CLASS = "11"

NUM_VAL = 1

VALUE = "1 km 16 days average relative azimuth angle"

END_OBJECT = PARAMETERNAME

END_OBJECT = MEASUREDPARAMETERCONTAINER

END_GROUP = MEASUREDPARAMETER

GROUP = COLLECTIONDESCRIPTIONCLASS

```
  OBJECT                = VERSIONID
    NUM_VAL             = 1
    VALUE               = 1
  END_OBJECT            = VERSIONID
  OBJECT                = SHORTNAME
    NUM_VAL             = 1
    VALUE               = "MOD13A2"
  END_OBJECT            = SHORTNAME
 END_GROUP              = COLLECTIONDESCRIPTIONCLASS
 GROUP                  = INPUTGRANULE
  OBJECT                = INPUTPOINTER
    NUM_VAL             = 16
    VALUE               = ("MODAGAGG.A2000129.h12v03.002.2000141041139.hdf",
"MODAGAGG.A2000130.h12v03.002.2000142002530.hdf",
"MODAGAGG.A2000134.h12v03.002.2000144180903.hdf",
"MODAGAGG.A2000138.h12v03.002.2000153152724.hdf",
"MODAGAGG.A2000139.h12v03.002.2000146065616.hdf", "

       MODAGAGG.A2000140.h12v03.002.2000147023341.hdf",
"MODAGAGG.A2000142.h12v03.002.2000148093933.hdf",
"MODAGAGG.A2000143.h12v03.002.2000149044849.hdf",
"MODAGAGG.A2000144.h12v03.002.2000149191241.hdf")
  END_OBJECT            = INPUTPOINTER
 END_GROUP              = INPUTGRANULE
 GROUP                  = SPATIALDOMAINCONTAINER
  GROUP                 = HORIZONTALSPATIALDOMAINCONTAINER
   GROUP                = GPOLYGON
    OBJECT              = GPOLYGONCONTAINER
     CLASS              = "1"
     GROUP              = GRINGPOINT
      CLASS             = "1"
      OBJECT            = GRINGPOINTLONGITUDE
```

```
            NUM_VAL             = 4
            CLASS               = "1"
            VALUE               = (-119.975003, -99.977781, -77.792984, -93.351581)
          END_OBJECT            = GRINGPOINTLONGITUDE
          OBJECT                = GRINGPOINTLATITUDE
            NUM_VAL             = 4
            CLASS               = "1"
            VALUE               = (60.000000, 60.000000, 50.000000, 50.000000)
          END_OBJECT            = GRINGPOINTLATITUDE
          OBJECT                = GRINGPOINTSEQUENCENO
            NUM_VAL             = 4
            CLASS               = "1"
            VALUE               = (1, 2, 3, 4)
          END_OBJECT            = GRINGPOINTSEQUENCENO
        END_GROUP               = GRINGPOINT
        GROUP                   = GRING
          CLASS                 = "1"
          OBJECT                = EXCLUSIONGRINGFLAG
            NUM_VAL             = 1
            CLASS               = "1"
            VALUE               = "N"
          END_OBJECT            = EXCLUSIONGRINGFLAG
        END_GROUP               = GRING
      END_OBJECT                = GPOLYGONCONTAINER
    END_GROUP                   = GPOLYGON
  END_GROUP                     = HORIZONTALSPATIALDOMAINCONTAINER
END_GROUP                       = SPATIALDOMAINCONTAINER
```

```
GROUP              = RANGEDATETIME
 OBJECT             = RANGEENDINGDATE
  NUM_VAL           = 1
  VALUE             = "2000-05-23"
 END_OBJECT         = RANGEENDINGDATE
 OBJECT             = RANGEENDINGTIME
  NUM_VAL           = 1
  VALUE             = "20:00:00.000000"
 END_OBJECT         = RANGEENDINGTIME
 OBJECT             = RANGEBEGINNINGDATE
  NUM_VAL           = 1
  VALUE             = "2000-05-08"
 END_OBJECT         = RANGEBEGINNINGDATE
 OBJECT             = RANGEBEGINNINGTIME
  NUM_VAL           = 1
  VALUE             = "07:10:00.000000"
 END_OBJECT         = RANGEBEGINNINGTIME
END_GROUP           = RANGEDATETIME
GROUP              = PGEVERSIONCLASS
 OBJECT             = PGEVERSION
  NUM_VAL           = 1
  VALUE             = "2.2.1"
 END_OBJECT         = PGEVERSION
END_GROUP           = PGEVERSIONCLASS
GROUP              = ASSOCIATEDPLATFORMINSTRUMENTSENSOR
 OBJECT             = ASSOCIATEDPLATFORMINSTRUMENTSENSORCONTAINER
  CLASS             = "1"
```

OBJECT = ASSOCIATEDSENSORSHORTNAME

CLASS = "1"

NUM_VAL = 1

VALUE = "CCD"

END_OBJECT = ASSOCIATEDSENSORSHORTNAME

OBJECT = ASSOCIATEDPLATFORMSHORTNAME

CLASS = "1"

NUM_VAL = 1

VALUE = "AM-1"

END_OBJECT = ASSOCIATEDPLATFORMSHORTNAME

OBJECT = ASSOCIATEDINSTRUMENTSHORTNAME

CLASS = "1"

NUM_VAL = 1

VALUE = "MODIS"

END_OBJECT = ASSOCIATEDINSTRUMENTSHORTNAME

END_OBJECT = ASSOCIATEDPLATFORMINSTRUMENTSENSORCONTAINER

END_GROUP = ASSOCIATEDPLATFORMINSTRUMENTSENSOR

GROUP = ADDITIONALATTRIBUTES

OBJECT = ADDITIONALATTRIBUTESCONTAINER

CLASS = "1"

OBJECT = ADDITIONALATTRIBUTENAME

CLASS = "1"

NUM_VAL = 1

VALUE = "QAPERCENTGOODQUALITY"

END_OBJECT = ADDITIONALATTRIBUTENAME

GROUP = INFORMATIONCONTENT

CLASS = "1"

```
    OBJECT                = PARAMETERVALUE
      NUM_VAL             = 1
      CLASS               = "1"
      VALUE               = "0"
    END_OBJECT            = PARAMETERVALUE
  END_GROUP               = INFORMATIONCONTENT
END_OBJECT                = ADDITIONALATTRIBUTESCONTAINER
OBJECT                    = ADDITIONALATTRIBUTESCONTAINER
  CLASS                   = "2"
  OBJECT                  = ADDITIONALATTRIBUTENAME
    CLASS                 = "2"
    NUM_VAL               = 1
    VALUE                 = "QAPERCENTOTHERQUALITY"
  END_OBJECT              = ADDITIONALATTRIBUTENAME
  GROUP                   = INFORMATIONCONTENT
    CLASS                 = "2"
    OBJECT                = PARAMETERVALUE
      NUM_VAL             = 1
      CLASS               = "2"
      VALUE               = "100"
    END_OBJECT            = PARAMETERVALUE
  END_GROUP               = INFORMATIONCONTENT
END_OBJECT                = ADDITIONALATTRIBUTESCONTAINER
OBJECT                    = ADDITIONALATTRIBUTESCONTAINER
  CLASS                   = "3"
  OBJECT                  = ADDITIONALATTRIBUTENAME
    CLASS                 = "3"
```

NUM_VAL = 1

VALUE = "QAPERCENTNOTPRODUCEDCLOUD"

END_OBJECT = ADDITIONALATTRIBUTENAME

GROUP = INFORMATIONCONTENT

CLASS = "3"

OBJECT = PARAMETERVALUE

NUM_VAL = 1

CLASS = "3"

VALUE = "0"

END_OBJECT = PARAMETERVALUE

END_GROUP = INFORMATIONCONTENT

END_OBJECT = ADDITIONALATTRIBUTESCONTAINER

OBJECT = ADDITIONALATTRIBUTESCONTAINER

CLASS = "4"

OBJECT = ADDITIONALATTRIBUTENAME

CLASS = "4"

NUM_VAL = 1

VALUE = "QAPERCENTNOTPRODUCEDOTHER"

END_OBJECT = ADDITIONALATTRIBUTENAME

GROUP = INFORMATIONCONTENT

CLASS = "4"

OBJECT = PARAMETERVALUE

NUM_VAL = 1

CLASS = "4"

VALUE = "0"

END_OBJECT = PARAMETERVALUE

END_GROUP = INFORMATIONCONTENT

```
END_OBJECT            = ADDITIONALATTRIBUTESCONTAINER
OBJECT                = ADDITIONALATTRIBUTESCONTAINER
  CLASS               = "5"
  OBJECT              = ADDITIONALATTRIBUTENAME
    CLASS             = "5"
    NUM_VAL           = 1
    VALUE             = "NDVI1KM16DAYQCLASSPERCENTAGE"
  END_OBJECT          = ADDITIONALATTRIBUTENAME
  GROUP               = INFORMATIONCONTENT
    CLASS             = "5"
    OBJECT            = PARAMETERVALUE
      NUM_VAL         = 1
      CLASS           = "5"
      VALUE           = "0"
    END_OBJECT        = PARAMETERVALUE
  END_GROUP           = INFORMATIONCONTENT
END_OBJECT            = ADDITIONALATTRIBUTESCONTAINER
OBJECT                = ADDITIONALATTRIBUTESCONTAINER
  CLASS               = "6"
  OBJECT              = ADDITIONALATTRIBUTENAME
    CLASS             = "6"
    NUM_VAL           = 1
    VALUE             = "EVI1KM16DAYQCLASSPERCENTAGE"
  END_OBJECT          = ADDITIONALATTRIBUTENAME
  GROUP               = INFORMATIONCONTENT
    CLASS             = "6"
    OBJECT            = PARAMETERVALUE
```

```
    NUM_VAL          = 1
    CLASS            = "6"
    VALUE            = "0"
   END_OBJECT        = PARAMETERVALUE
  END_GROUP          = INFORMATIONCONTENT
END_OBJECT           = ADDITIONALATTRIBUTESCONTAINER
OBJECT               = ADDITIONALATTRIBUTESCONTAINER
  CLASS              = "7"
  OBJECT             = ADDITIONALATTRIBUTENAME
    CLASS            = "7"
    NUM_VAL          = 1
    VALUE            = "HORIZONTALTILENUMBER"
  END_OBJECT         = ADDITIONALATTRIBUTENAME
  GROUP              = INFORMATIONCONTENT
    CLASS            = "7"
    OBJECT           = PARAMETERVALUE
      NUM_VAL        = 1
      CLASS          = "7"
      VALUE          = "12"
    END_OBJECT       = PARAMETERVALUE
  END_GROUP          = INFORMATIONCONTENT
END_OBJECT           = ADDITIONALATTRIBUTESCONTAINER
OBJECT               = ADDITIONALATTRIBUTESCONTAINER
  CLASS              = "8"
  OBJECT             = ADDITIONALATTRIBUTENAME
    CLASS            = "8"
    NUM_VAL          = 1
```

```
    VALUE               = "VERTICALTILENUMBER"
  END_OBJECT            = ADDITIONALATTRIBUTENAME
  GROUP                 = INFORMATIONCONTENT
    CLASS               = "8"
    OBJECT              = PARAMETERVALUE
      NUM_VAL           = 1
      CLASS             = "8"
      VALUE             = "03"
    END_OBJECT          = PARAMETERVALUE
  END_GROUP             = INFORMATIONCONTENT
END_OBJECT              = ADDITIONALATTRIBUTESCONTAINER
OBJECT                  = ADDITIONALATTRIBUTESCONTAINER
  CLASS                 = "9"
  OBJECT                = ADDITIONALATTRIBUTENAME
    CLASS               = "9"
    NUM_VAL             = 1
    VALUE               = "TileID"
  END_OBJECT            = ADDITIONALATTRIBUTENAME
  GROUP                 = INFORMATIONCONTENT
    CLASS               = "9"
    OBJECT              = PARAMETERVALUE
      NUM_VAL           = 1
      CLASS             = "9"
      VALUE             = "11012003"
    END_OBJECT          = PARAMETERVALUE
  END_GROUP             = INFORMATIONCONTENT
END_OBJECT              = ADDITIONALATTRIBUTESCONTAINER
```

END_GROUP = ADDITIONALATTRIBUTES

END_GROUP = INVENTORYMETADATA

END

Archive Metadata

GROUP = ARCHIVEDMETADATA

GROUPTYPE = MASTERGROUP

OBJECT = CHARACTERISTICBINANGULARSIZE

NUM_VAL = 1

VALUE = 30.000000

END_OBJECT = CHARACTERISTICBINANGULARSIZE

OBJECT = CHARACTERISTICBINSIZE

NUM_VAL = 1

VALUE = 926.625433

END_OBJECT = CHARACTERISTICBINSIZE

OBJECT = DATACOLUMNS

NUM_VAL = 1

VALUE = 1200

END_OBJECT = DATACOLUMNS

OBJECT = DATAROWS

NUM_VAL = 1

VALUE = 1200

END_OBJECT = DATAROWS

OBJECT = GLOBALGRIDCOLUMNS

NUM_VAL = 1

VALUE = 43200

END_OBJECT = GLOBALGRIDCOLUMNS

OBJECT = GLOBALGRIDROWS

NUM_VAL = 1

VALUE = 21600

END_OBJECT = GLOBALGRIDROWS

OBJECT = NUMBEROFDAYS

NUM_VAL = 1

VALUE = 9

END_OBJECT = NUMBEROFDAYS

OBJECT = DAYSOFYEAR

NUM_VAL = 16

VALUE = (129, 130, 134, 138, 139, 140, 142, 143, 144, -1, -1, -1, -1, -1, -1, -1)

END_OBJECT = DAYSOFYEAR

OBJECT = SPSOPARAMETERS

NUM_VAL = 4

VALUE = ("2749", "4334", "2749a", "4334a")

END_OBJECT = SPSOPARAMETERS

OBJECT = ALGORITHMPACKAGEACCEPTANCEDATE

NUM_VAL = 1

VALUE = "1998-03-31"

END_OBJECT = ALGORITHMPACKAGEACCEPTANCEDATE

OBJECT = ALGORITHMPACKAGEMATURITYCODE

NUM_VAL = 1

VALUE = "LAUNCH"

END_OBJECT = ALGORITHMPACKAGEMATURITYCODE

OBJECT = ALGORITHMPACKAGENAME

NUM_VAL = 1

VALUE = "MOD13A2"

END_OBJECT = ALGORITHMPACKAGENAME

OBJECT = ALGORITHMPACKAGEVERSION

NUM_VAL = 1

VALUE = "2"

END_OBJECT = ALGORITHMPACKAGEVERSION

OBJECT = GEOANYABNORMAL

NUM_VAL = 1

VALUE = "False"

END_OBJECT = GEOANYABNORMAL

OBJECT = GEOESTMAXRMSERROR

NUM_VAL = 1

VALUE = 500.000000

END_OBJECT = GEOESTMAXRMSERROR

OBJECT = INSTRUMENTNAME

NUM_VAL = 1

VALUE = "Moderate-Resolution Imaging SpectroRadiometer"

END_OBJECT = INSTRUMENTNAME

OBJECT = LONGNAME

NUM_VAL = 1

VALUE = "MODIS Vegetation Index (16 day 1km)"

END_OBJECT = LONGNAME

OBJECT = PROCESSINGCENTER

NUM_VAL = 1

VALUE = "MODAPS"

END_OBJECT = PROCESSINGCENTER

OBJECT = INPUTFILENAME

NUM_VAL = 16

VALUE = ("MODAGAGG.A2000129.h12v03.002.2000141041139.hdf",
"MODAGAGG.A2000130.h12v03.002.2000142002530.hdf",
"MODAGAGG.A2000134.h12v03.002.2000144180903.hdf",
"MODAGAGG.A2000138.h12v03.002.2000153152724.hdf",
"MODAGAGG.A2000139.h12v03.002.2000146065616.hdf", "

MODAGAGG.A2000140.h12v03.002.2000147023341.hdf",
"MODAGAGG.A2000142.h12v03.002.2000148093933.hdf",
"MODAGAGG.A2000143.h12v03.002.2000149044849.hdf",
"MODAGAGG.A2000144.h12v03.002.2000149191241.hdf")

END_OBJECT = INPUTFILENAME

OBJECT = QAPERCENTPOORQ1KM16DAYNDVI

NUM_VAL = 16

VALUE = (0, 0, 0, 0, 23, 9, 35, 25, 5, 2, 1, 0, 0, 0, 0, 0)

END_OBJECT = QAPERCENTPOORQ1KM16DAYNDVI

OBJECT = QAPERCENTPOORQ1KM16DAYEVI

NUM_VAL = 16

VALUE = (0, 0, 0, 0, 23, 9, 35, 25, 5, 2, 1, 0, 0, 0, 0, 0)

END_OBJECT = QAPERCENTPOORQ1KM16DAYEVI

GROUP = BOUNDINGRECTANGLE

OBJECT = NORTHBOUNDINGCOORDINATE

NUM_VAL = 1

VALUE = 60.000000

END_OBJECT = NORTHBOUNDINGCOORDINATE

OBJECT = SOUTHBOUNDINGCOORDINATE

NUM_VAL = 1

VALUE = 50.000000

END_OBJECT = SOUTHBOUNDINGCOORDINATE

OBJECT = EASTBOUNDINGCOORDINATE

NUM_VAL = 1

VALUE = -77.792984

END_OBJECT = EASTBOUNDINGCOORDINATE

OBJECT = WESTBOUNDINGCOORDINATE

NUM_VAL = 1

VALUE = -119.975003

```
    END_OBJECT           = WESTBOUNDINGCOORDINATE
  END_GROUP            = BOUNDINGRECTANGLE
  OBJECT               = PERCENTLAND
    NUM_VAL            = 1
    VALUE              = 100
  END_OBJECT           = PERCENTLAND
  OBJECT               = SEAPROCESSED
    NUM_VAL            = 1
    VALUE              = "Yes"
  END_OBJECT           = SEAPROCESSED
  OBJECT               = DESCRREVISION
    NUM_VAL            = 1
    VALUE              = "1.0"
END_OBJECT             = DESCRREVISION
END_GROUP              = ARCHIVEDMETADATA
END
```